

R
071080

JPRS-UMA-86-001

8 January 1986

USSR Report

MILITARY AFFAIRS

FOREIGN MILITARY REVIEW

No. 8, August 1985

19990319 090

DISTRIBUTION STATEMENT A
Approved for Public Release
Distribution Unlimited

DTIC QUALITY INSPECTED 4

FBIS

FOREIGN BROADCAST INFORMATION SERVICE

REPRODUCED BY
NATIONAL TECHNICAL
INFORMATION SERVICE
U.S. DEPARTMENT OF COMMERCE
SPRINGFIELD, VA. 22161

12
56
A04

NOTE

JPRS publications contain information primarily from foreign newspapers, periodicals and books, but also from news agency transmissions and broadcasts. Materials from foreign-language sources are translated; those from English-language sources are transcribed or reprinted, with the original phrasing and other characteristics retained.

Headlines, editorial reports, and material enclosed in brackets [] are supplied by JPRS. Processing indicators such as [Text] or [Excerpt] in the first line of each item, or following the last line of a brief, indicate how the original information was processed. Where no processing indicator is given, the information was summarized or extracted.

Unfamiliar names rendered phonetically or transliterated are enclosed in parentheses. Words or names preceded by a question mark and enclosed in parentheses were not clear in the original but have been supplied as appropriate in context. Other unattributed parenthetical notes within the body of an item originate with the source. Times within items are as given by source.

The contents of this publication in no way represent the policies, views or attitudes of the U.S. Government.

PROCUREMENT OF PUBLICATIONS

JPRS publications may be ordered from the National Technical Information Service (NTIS), Springfield, Virginia 22161. In ordering, it is recommended that the JPRS number, title, date and author, if applicable, of publication be cited.

Current JPRS publications are announced in Government Reports Announcements issued semimonthly by the NTIS, and are listed in the Monthly Catalog of U.S. Government Publications issued by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Correspondence pertaining to matters other than procurement may be addressed to Joint Publications Research Service, 1000 North Glebe Road, Arlington, Virginia 22201.

Soviet books and journal articles displaying a copyright notice are reproduced and sold by NTIS with permission of the copyright agency of the Soviet Union. Permission for further reproduction must be obtained from copyright owner.

8 January 1986

USSR REPORT

MILITARY AFFAIRS

FOREIGN MILITARY REVIEW

No 8, August 1985

Except where indicated otherwise in the table of contents, the following is a complete translation of the Russian-language monthly journal ZARUBEZHNOYE VOYENNOYE OBOZRENIYE, published in Moscow by the Ministry of Defense.

CONTENTS

Promoting the People's Welfare--the CPSU's Highest Goal (pp 3-6)
(Editorial) (not translated)

GENERAL MILITARY PROBLEMS

U.S. Intelligence Community Examined (pp 7-12)
(V. Gidasov).....1

Ideological Processing of Israeli Service Personnel (pp 13-17)
(V. Krysko) (not translated)

Jordan's Armed Forces (pp 18-22)
(A. Mayakov) (not translated)

U.S. Fiscal Year 1986 Defense Budget Examined (pp 23-28)
(E. Zybrov, I. Leonidov).....10

GROUND FORCES

Tanker Training in the U.S. and FRG Armies (pp 29-32)
(L. Ryazanov, V. Sazonov) (not translated)

Tactics: U.S. Infantry Platoon -- All-Round Defense (pp 33-34)
(I. Aleksandrov).....20

Great Britain's Ground Forces (pp 34-40)
(N. Fomich) (not translated)

Tactical POL Transshipment Point for Rapid Deployment
Forces (pp 41-44)
(I. Danilchenko, V. Bychkov).....23

Plans for Building an European Helicopter (p 44)
(V. Nelin) (not translated)

AIR FORCES

Pilot Training for Great Britain's Air Force (pp 45-50) (V. Artemev) (not translated)	
British, Joint Air Defense Training Discussed (pp 50-52) (G. Veselovskiy).....	28
Air-to-Ground Anti-Radar Missiles (pp 52-56) (B. Mikhaylov)	31
Radar Systems Using Principle of Frequency Separation (pp 56-60) (V. Pavlov, S. Grishulin).....	36

NAVAL FORCES

Italian Naval Forces (pp 61-67) (S. Vladimirov) (not translated)	
New Directions in Development of Intelligence Collection Systems (pp 67-69) (K. Yakovlev).....	43
"ARAPAHO" System of Flight Decking for Container Transports (pp 69-71) (M. Pavlov).....	48
Capitalist Countries' Air Forces' Aircraft Tactical-Technical Characteristics (pp 72-74) (Yu. Chukhchin) (not translated)	

INFORMATION, EVENTS, FACTS (pp 75-78) (not translated)

FOREIGN MILITARY CHRONICLE (pp 79-80) (not translated)

PUBLICATION DATA

English title : FOREIGN MILITARY REVIEW,
No. 8, 1985

Russian Title : ZARUBEZHNOYE VOYENNOYE OBOZRENIYE

Author (s) :

Editor (s) : I.I. Bugrov

Publishing House : Voenizdat

Place of Publication : Moscow

Date of Publication : August, 1985

Signed to press : 7 August 1985

Copies :

COPYRIGHT : "Zarubezhnoye voyennoye obozreniye"

FOREIGN MILITARY AFFAIRS

U.S. INTELLIGENCE COMMUNITY EXAMINED

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 8, Jul 85 (Signed to press 7 Aug 85) pp: 7-12

[Article by MAJ GEN V. Gidaspov; "The U.S.'s Intelligence Community;" passages rendered in all capital letters printed in boldface in source]

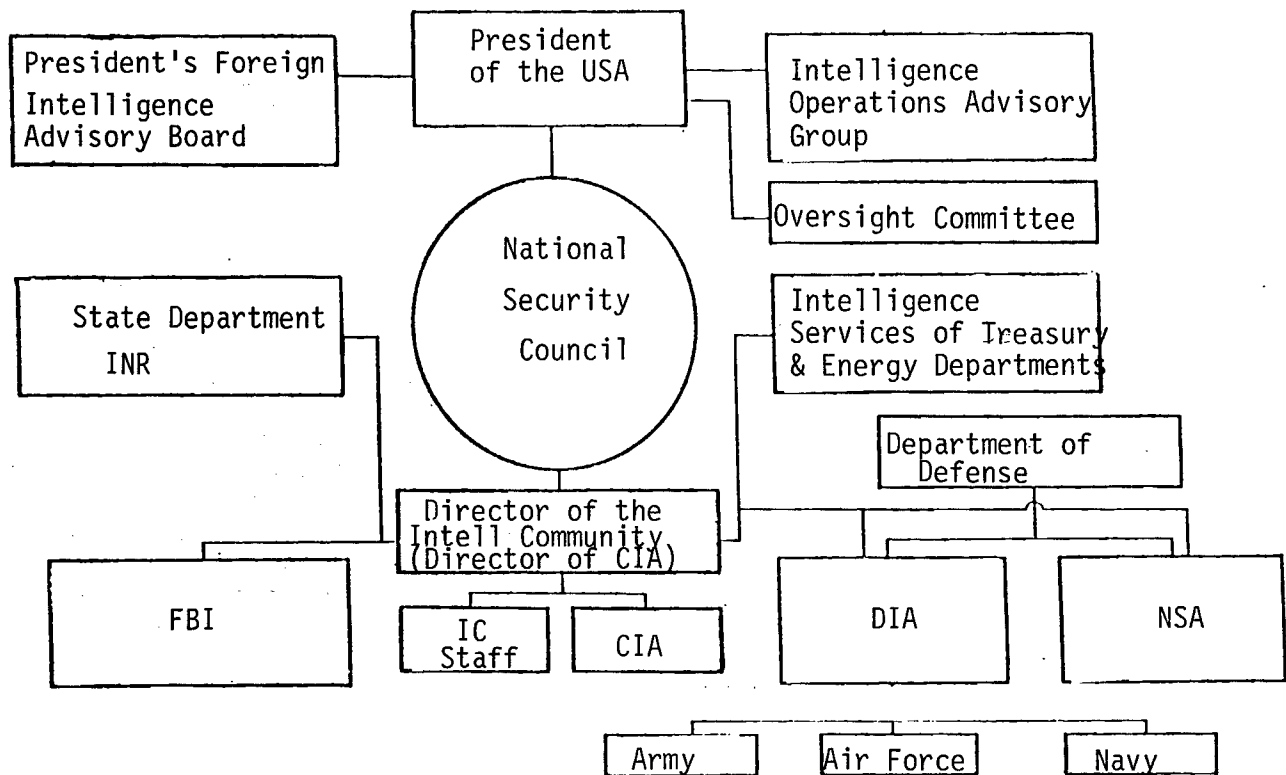
[TEXT] The aggressive imperialist policy being conducted by the U.S. administration has led, in the last decade, to an unprecedented quantitative growth in intelligence services with various departmental affiliations and to an increase in their role in the formulation and implementation of the nation's foreign policy course. The most turbulent period in its development took place between 1946 and 1949. It was precisely during this period that the Central Intelligence Agency (CIA) was created, which along with other organizations of similar character, was to be the basis of a U.S. "intelligence community." In this article we will examine mainly the staff and tasks of this community, unofficially known sometimes as the USA's "invisible government."

The basic organs of the "intelligence community" (see illustration), as seen in the foreign press, are the CIA, Defense Intelligence Agency (DIA) with its subordinated intelligence services of the military departments (Army, Navy, Air Force), the Defense Department's National Security Agency (NSA), the Bureau of Intelligence and Research of the State Department, the intelligence services of the Departments of Energy and Treasury and the Federal Bureau of Investigation (FBI).

The activity of all these community staff elements, by foreign specialists' estimate, cannot be effective unless it is coordinated by a single central directorate. Such coordinating functions are executed by the NATIONAL SECURITY COUNCIL (NSC), the chairman of which is the president. Namely, the NSC devises the general policy of the entire Intelligence Community (IC), and through the Director of the CIA (DCI), effectively runs its entire intelligence activity.

Overall general direction of the IC was given to the Director of the CIA immediately following the creation of the CIA. However, his role was significantly enhanced after 1971, when President Nixon decided to strengthen the authority of this chief relative to the overall IC. To implement this

decision, the "intelligence staff" was created in March, 1972, and is the working organ of the Director, CIA, in his role as chief of the community. It integrates three main directorates and 13 committees, which are occupied with issues of planning, coordinating and evaluating the activities of the various types of intelligence and coordinating the budget appropriations to the intelligence program elements. The staff is not part of the CIA; it develops directives which have the force of orders for the whole IC.



U.S. Intelligence Community Structure

The director, through the staff, organizes the processing and analysis of information received from all the services and the reporting of it to various interested and affected activities.

The NSC is not the only organization overseeing the IC. Under the president of the USA, there is a special CONSULTATIVE GROUP FOR INTELLIGENCE OPERATIONS. It reviews suggestions for conducting special clandestine operations, evaluates these suggestions from the point of view of their efficacy, and develops recommendations (to approve, delay or modify) for the president. The consultative group is chaired by the National Security Advisor and includes in its membership the Secretary of State, Secretary of Defense,

the Chairman of the Joint Chiefs of Staff and the Director of the Intelligence Community (who is also the director of the CIA).

In addition to these two organs, the president's staff also includes a "consultative council for overseas intelligence activities." Its membership is appointed by the president and includes prominent civil and political leaders (former military leaders, scientists in various areas of study, etc.) who do not occupy governmental posts.

In order to conform with the observance of legalities and to ease the fears of the American society, especially of those parts of it which are concerned with uncontrolled activity of various clandestine services, there is a so-called oversight committee, independent of any federal organ. It exercises control over "conformity with the law" in the activities of intelligence organs, prepares quarterly reviews with conclusions concerning maintaining the "legality and propriety" of intelligence activities.

Such are the organizations and primary tasks of the U.S. top level intelligence agencies. Let us now look at the main components of the actual Intelligence Community.

The CENTRAL INTELLIGENCE AGENCY (CIA), created in 1947, is the heart of the community. Officially, as reported in the foreign press, the main responsibilities of the CIA are: developing recommendations to the NSC on intelligence operations by governmental agencies in the interests of ensuring the national security; presenting to the NSC its suggestions for coordinating all intelligence activities; collecting, analyzing, estimating, sorting and distributing collected information, which is specially annotated according to the addressee; deciding, in response to NSC assignment, on the allocation of special tasks to responsible agencies, and the execution of other special assignments.

The activities of this organization in fact go well beyond the framework of its delineated tasks. Every time, when the interference of the U.S. in the internal affairs of sovereign governments is uncovered, the peace-loving people of the world receive indisputable proof of participation by this "omnipotent" CIA. Thus, its interference, as a rule, is tied to all kinds of subversive activity, and occasionally with direct physical executions. Thus, the whole world is aware of its participation in the cruel executions involving Chilean patriots, events in Grenada and in Nicaragua. The CIA's main efforts of the CIA, as of the overall intelligence community, are directed toward the struggle against the USSR and other countries of the socialist community and against the international communist, workers' and national liberation movements.

In addition, it has been known, for a long time from information leaked in the press to a wide circle of society, that the CIA organizes on a broad scale trailing of American citizens within the territory of the USA, maintains dossiers on them, intercepts and opens personal correspondence and intercepts and transcribes telephone conversations of individuals and civil servants. It infiltrates various organizations, illegally aids certain governmental agencies and institutions, and practices interference in internal politics by

all available methods. Finally, without warning or permission, it controls people's activities with drugs and other substances, negatively influencing their mental and physical health.

To implement such multiple and varied activities, the CIA has a professional staff of many thousands. In the judgment of foreign specialists, the agency's annual budget exceeds two billion dollars. Organizationally, as noted in the foreign press, it consists of a central headquarters and branches, located in all major cities in the USA. The majority of the branches work under the cover of various firms and commercial enterprises. In addition, the CIA has available a considerable number of resident agents, under cover in embassies and other posts of the U.S. in foreign countries, in divisions of American businesses and banks, and branch banks located within military bases.

The main office of the CIA contains four major and five regional directorates, an estimates section and a number of other elements.

The most important among the major directorates and the main supplier of information is the intelligence directorate. It is responsible both for information collection and for the totality of intelligence information. Under President Carter, this directorate was renamed, but under CIA Director Casey, a Reagan appointee, it reverted to its former name.

The Operations Directorate, in foreign specialists' opinion, is the second most important, being responsible for organization and conduct of secret operations and implementation of counterintelligence functions.

The Scientific-Technical directorate is primarily concerned with collection and processing of information obtained from technical means (aircraft, satellites, etc.)

The Administrative Directorate busies itself with selection and placement of personnel, material and technical supply matters and questions of a financial nature.

Regional Directorates (there are five) cover all regions of the world: Africa and Latin America, Europe, Soviet Union, Middle East and South Asia, and East Asia.

The evaluation section is responsible for the ultimate processing of the most important intelligence information, preparation of summary reports and advice to the president and the NSC.

For reasons which are fully understandable, detailed organizational structure, functional duties of key personnel, the dispersed espionage network, the actual numbers and expenditures of the CIA are held in the strictest secrecy. But even the information which infrequently permeates the pages of the foreign press gives a picture of the role of this spy agency as it works out the imperialistic policies of American monopolies.

The DEFENSE INTELLIGENCE AGENCY (DIA) is the highest organ of defense strategic intelligence. It manages the intelligence directorates of the armed forces and the military attache system. The DIA is the main processing and analysis center of all intelligence information on foreign governments' armed forces. Like the CIA, it includes four main directorates: for general defense intelligence programs, for the preparation of recommendations concerning the staffing and structure of promising, and evaluating existing, intelligence systems; management and operation (responsible for deployment of various intelligence forces and personnel readiness); and foreign intelligence (primary organ for collecting intelligence information). These are further broken down into the following seven subdirectorates: operational, planning, estimates and analysis, general security, collection and processing of intelligence data, scientific and technical intelligence, and management of the attache system.

The size of the DIA staff, according to the foreign press, is 5,000, with an annual budget over 200 million dollars. Overall, the personnel comprising the defense intelligence community exceeds 135,000 and their expenditures reach on an annual basis the astronomical figure of 5.4 billion dollars.

The official date of establishment of this defense espionage agency--closely linked to the CIA--is August 1, 1961. Its first head was an FBI colleague, LT GEN D. Carrol, whose two deputies (two former CIA agents) were BGEN V. Quinn and RADM S. Frankel. DIA, along with carrying out the leadership function of the activities of the service intelligence agencies and their forces, evaluates requirements of defense and politico-military leadership for information on the policies, economics and armed forces of probable enemies, allies, neutrals and unaligned countries; it remains active in R & D activities for purposes of further development of the forces, methods, means and abilities for intelligence; and finally maintains a centralized accounting of all collected information.

To carry out surveillance, analysis and estimates in defense, economic, scientific, technical and other areas, the DIA, in addition to substantial numbers of qualified analyst-specialists, utilizes numerous scientific-investigative institutions, centers and laboratories, not only from the armed forces, but also governmental and private. For example, the Library of Congress, "non-profit" RAND corporation and the Institute of Defense Analysis. The Library of Congress' military research section alone provided DIA with more than 20,000 excerpts from issues of the foreign press, maintains in its automated system more than 50,000 extracts on various areas of knowledge, and issues over 200 serious reviews on assorted themes. The foreign press reports that in 1976, the DIA concluded contracts with the Library of Congress alone in excess of 3 million dollars.

In addition, the intelligence directorate annually signs a series of contracts with external organizations to conduct scientific research across a broad front. In particular, related work includes: research on the cost of arms and military expenditures of the Warsaw Pact countries being conducted by the Radio Corporation of America (RCA) and McDonnell Douglas; improvement of the military-technical intelligence in the area of nuclear research, undertaken by the Los Alamos Laboratories; studies of various issues, raised in connection

with talks on strategic arms limitations; and a DIA-directed geographic review of the world's countries, in response to tasking by the State Department. The head of the DIA, LT GEN Williams, is subordinate to the Secretary of Defense through the Deputy SECDEF for Political-Military Affairs and the Assistant SECDEF for Intelligence, is the director of military intelligence.

DIA's primary operational organ is the National [Military] Intelligence Center (NMIC), located in the Pentagon. With round-the-clock operation, the center is equipped with the most modern techniques for automated collection, processing, analysis and display of information.

The next important element of the IC is the NATIONAL SECURITY AGENCY (NSA). Just as the DIA, it is subordinated to the Defense Department through the Director of Military Intelligence and Deputy Secretary for Politico-Military Affairs.

According to the American press, the NSA is responsible for: control over the activities of communications agencies in information collection; security of governmental, diplomatic and military enciphered correspondence, as well as the security and secrecy of communications information transmitted over covered channels; deciphering foreign communications; organization of radio and communications intelligence on a global scale; coordination of the activities of forces and resources of the armed forces in this type of intelligence, conduct of various R & D, in particular, the development of new means of communications intelligence operations and coding and decoding; and direction of the armed forces in the security services.

To do all this, NSA operates a modern apparatus of communications intelligence activities, deployed in the U.S. as well as at American military bases overseas, on numerous airborne platforms, combatants, civilian ships, in embassies, missions, and other American establishments. According to the foreign press, the NSA staff exceeds 60,000 people; its annual budget is more than 10 billion dollars.

The U.S. Army intelligence service is headed by the Assistant Chief of Staff for Intelligence (ACSI). It consists of an intelligence directorate, the Army's intelligence and security headquarters, as well as a number of peripheral organizations and elements.

The ACSI organizes the Army's entire intelligence activity; planning and coordination, training of personnel and foreign military specialists, R&D, etc. Overall, according to the foreign press, in Army intelligence within the continental U.S., overseas territories and military bases located in other countries there are more than 35,000 personnel. Army intelligence has an annual budget of about 700 million dollars.

The Air Force intelligence service is also headed by an assistant chief of staff for intelligence (ACSI). He coordinates all USAF intelligence activities related to collection, study and analysis of information and reporting to interested offices. Air Force intelligence forces and resources are in the principal detachments and units of reconnaissance aviation, present in both the strategic and tactical air commands as well as in the USAF command

in the overseas European and Pacific TVDs [USAFE & PACAF]. These include all means of surveillance which acquire information from satellites. According to the foreign press, Air Force intelligence has more than 56,000 personnel and an annual budget of 2.7 billion dollars.

The head of the Navy's intelligence agency [DNI] operates an intelligence command. It comprises four sections (information, security of submarine intelligence activities, external communications and information security). The DNI is responsible for organizing all means of intelligence collection under the Navy Department's management: surface ships and submarines of various classes, shore-based patrol and carrier-based aircraft. The foreign press reports that there are almost 15,000 personnel in naval intelligence and an annual budget of about 600 million dollars.

In addition to the above-mentioned intelligence organizations, many organizations of governmental agencies and departments are involved in espionage and subversive activities.

The STATE DEPARTMENT BUREAU OF INTELLIGENCE AND RESEARCH (INR) is the central working organization of this well known governmental institution. It is headed by a director who is simultaneously an Assistant Secretary of State for Intelligence Matters. He has four deputies: administrative affairs, coordination, functional research and regional research.

The offices of the executive director, external communications and current intelligence, are subordinated to the Deputy for Administrative matters.

The office of the Executive Director is responsible for administrative support of all detachments, the selection and employment of cadres in the bureau, for distribution of budget appropriations and control over expenditures.

The office of external communications conducts the exchange of information between governments, individuals and other organizations who are occupied with research in political areas. It also enters into contracts with various organizations for research for other government departments and hires consultants, advisors, experts, etc.

The current intelligence directorate is responsible for round-the-clock operation of a collection and processing center for all intelligence information received from nearly 250 American embassies and other overseas legations as well as from other members of the IC--numerous governmental and private organizations.

The Bureau's deputy director for coordination supervises three directorates--operations, reciprocity, and resources.

The deputy director for functional research heads up three sections--economic research and analysis, strategic and general research and geographic research.

The economic research and analysis directorate is concerned about effective support of American foreign trade and economic assistance programs. It also tracks the affairs of various economic groups, capable of exerting influence

on worldwide political prospects (e.g., the Common Market) and it studies the economies of various countries.

The strategic and general research directorate studies problems ties to the influence of foreign countries' armed forces on international politics. It analyzes the contents of various discussions on limitation or reduction of armed forces and armaments as well as the activities of international organizations.

The geographical directorate is concerned with the problems of the influence of geographic conditions on international relations and law of the sea, oversees publications of charts, diagrams and graphic displays for governmental departments.

The deputy director for zonal (regional) research manages the directorate of research and analysis of:

- the Soviet Union
- Europe
- East Asia and the Indian Ocean
- Near East and South Asia

The FEDERAL BUREAU OF INVESTIGATION (headquartered in Washington) is a constituent component of the intelligence community; it is the secret political investigation service. It coordinates the work of all agencies which ensure the nation's internal security. Organizationally, it has 59 territorial offices, the most significant of which is the New York office, as well as 526 representative offices located in all 50 states. The basic structure of the FBI consist of over 16,000 professionals, with higher law and economic degrees, and 64 per cent of its staff are former military personnel. The Director of the FBI reports to the Attorney General.

The FBI takes the most active role in the compilation of intelligence information not only within U.S. territory, but also overseas, using for this its many-thousand agents in official and unofficial American representations, and the intelligence (and counterintelligence) service of many capitalist governments.

The INTELLIGENCE SERVICES OF THE DEPARTMENT OF TREASURY AND ENERGY collect information (mainly of issues of energy technology, economics and finance) by all available means.

Such are the basic functions and components of the celebrated "intelligence community" of the United States, without the interference of which not one serious issue of foreign or internal policy of the most-powerful imperialistic government is decided. The activity of the American intelligence service, its "invisible government," is similar to a cancerous tumor, spreading to all regions of the earth, and to all countries and continents.

For the Soviet people, the army and navy service personnel, it is necessary to know and to continually remember that the subversive activities of various secret services of capitalist countries, foremost of which is the United States, are directed first against the Soviet Union and other countries of the socialist camp, and that all these groups and the "invisible government" have as their main objective the struggle against communism democracy and progress. All this obliges our service personnel to follow vigilantly the intrigues of the enemies of peace and socialism, to be in a state of constant military preparedness and to stand with a sharp eye on guard of embattled socialism.

COPYRIGHT: "Zarubezhnoye voyennoye obozreniye," 1985

9355

CSO: 1801/25

FOREIGN MILITARY AFFAIRS

U.S. FY 1986 DEFENSE BUDGET EXAMINED

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 8, Aug 85 (Signed to press 7 Aug 85) pp: 23-28

[Article by Col E. Zubrov, Lt Col I. Leonidov, Candidate for Economic Sciences; "Draft U.S. Defense Department's Fiscal Year 1986 Budget"]

[Text] The Soviet Union and the countries of the Socialist community actively and consistently put into practice the policy of peaceful coexistence for states with different socio-economic systems. The USSR appears in the world arena as the initiator of many peaceful proposals and negotiations concerning disarmament and arms reduction. However, while attempting to counteract the objective logic of social development, imperialism pursued a policy of exacerbation of the international situation and of direct confrontation with the Warsaw Pact countries. This striving is manifested especially vividly in the activities of the administration of the largest imperialistic state--the United States of America. As noted in the CPSU Central Committee's April (1985) Plenum, "The ruling circles of the United States of America, first and foremost, bear the responsibility for the situation which has developed... They continue to appear as the leaders of the arms race and they sabotage disarmament... All the new types of weapons of mass destruction were developed on their initiative. Today they are attempting to spread the arms race to outer space."

With President Reagan's accession to power in 1981, the U.S. policy toward the USSR became more aggressive and openly hostile. Having approved, in June 1981, the new administration's economic program, the Congress, simultaneously, sanctioned a long-term and large-scale program for building up military power in order to further strengthen the United States' leading role in the capitalist world and to guarantee to it military superiority over the Soviet Union. Its other main goal is the modernization of military production and the branches of the American economy tied to it.

Completion of the military program envisages a tremendous mobilization of the country's material and financial resources. It occupied, in essence, the predominant position in the American administration's economic policy and infers a technical retooling and an increase in the readiness of military industry for mobilization and the development and building of new expensive weapon systems. In turn, all this demanded a significant increase in

appropriations for military purposes and led to a sharp growth of the defense department's budget. One of the means for financing the military preparedness, unprecedented in peace time, was the limiting and, in some cases, curtailment of governmental non-military expenditures. Reagan became the first president who pursued a course to limit governmental expenditures on social programs.

Federal appropriations for rendering various types of help to the aged, children and invalids were subjected to the most radical curtailments--in FY-83 (sic), roughly 40 per cent in comparison to 1981. The expenditures, or their rate of growth, for such programs as "Transport," "Natural Resources and the Environment," "Education, Training, Employment and Social Service," and others were reduced. It was suggested that, these measures, despite the increase of expenditures for military purposes, will allow reducing the federal budget deficit and, after 1984, will even create conditions for an excess of revenue over expenditures.

However, as the foreign press shows concerning this, the realization of the Reagan Administration's program has led to a significant destabilization of the federal budget, not only in not permitting a significant deficit to be avoided but, on the contrary, has led to its growth. As a result, during the President's first term of office, the national debt was increased from 1 trillion to 1.6 trillion dollars and, in fiscal year 1986, it may reach 2 trillion. In FY-86, it is intended to project more than 140 billion dollars, or more than 18 per cent of the federal revenue, for interest payment alone.

The budget for FY-86 (beginning on 1 October 1985) is the first in Reagan's new term of office. Just as with previous budgets, the draft for 1986 is evidence of the American administration's aspirations to follow, in the future, a policy directed at expanding the arms race, undermining the strategic balance which has taken shape in the world, and continuing the "crusade" against communism. The defense department's draft budget, being reviewed by Congress, is oriented toward a further militarization of the U.S. economy, while its growth, as in previous years, will be accomplished by a simultaneous reduction and sometimes even the liquidation of individual social programs.

For FY-86, the official U.S. military budget (the so-called federal "National Defense" program) is planned by the administration on a scale of 322.2 billion dollars, which exceeds the previous year's level by 10.2 per cent. A significant growth is projected for it in the future. One can see from the draft budget that, in FY-90, the appropriation for military purposes should reach 488.1 billion dollars and over a five-year period (1986-1990), it will amount to the astronomical sum of 2 trillion dollars. The American specialists are planning for U.S. military expenditures on the scale of 428.6 billion dollars in 1990 or 68.9 per cent higher than in 1985.

According to American press data, the expansion of the scale of military preparations in the U.S., so significant in peace time, will lead to the military expenditures' share of the gross national product increasing to as high as 7.8 per cent and in the federal budget, up to 37.4 per cent (6.4 and 27.7 per cent respectively in 1984). A further transfer of resources from

civilian to military purposes will occur, to the detriment of millions of Americans.

The defense department's budget is the most important indicator of the scale and structure of U.S. military preparedness. In FY-86, according to foreign press information, it is planned to allot 313.7 billion dollars to the Pentagon (larger than 1985 by 10.2 per cent). Its share will be about 97.4 per cent of all resources being allotted to the "national defense" program.

Concurrently with the defense department, significant sums will go to other federal departments for military purposes. Thus, the major part of the programs for using nuclear energy, for the Pentagon's benefit, is managed by the Department of Energy. In FY-86, the administration requested 8 billion dollars for specific programs (a growth of 9.6 per cent for the year). A large part of these resources (4.6 billion dollars) is being appropriated for the development, testing and production of nuclear weapons. The creation of nuclear materials and the storing of radio active waste requires another 2.7 billion dollars. The development of nuclear reactors for the Navy is an important and continuously-expanding component part of the energy department's military program. In 1986, it is proposed to allocate 586 million dollars for this purpose, or 19.2 per cent more than in 1985.

The Federal Emergency Management Agency Conditions is of great significance to the military and economic preparedness of the U.S. To provide for its operation in FY-86, 274 million dollars is being requested. By these resources an improvement of the U.S. civil defense system, the preparation of the basic branches of industry for war, the training of key reserve cadres and other measures will be carried out.

American press materials are evidence of the fact that simultaneously with the appropriations being allocated by the official "National Defense" program, significant resources for military purposes are being directed to a number of civilian items of the federal budget. The activity of the National Aeronautics and Space Administration (NASA) is an obvious example of this. This organization's budget outwardly has a purely civilian direction and is carried on as a federal "general science, space and technology" program. However, (even by the evidence of the Americans themselves) it, is oriented, to a large degree, toward executing military missions. In particular, a significant part of the resources being allocated to NASA are directed toward building, testing, and completing multi-purpose space systems including the SHUTTLE, a reuseable piloted space vehicle, the flights of which are carried out first of all, in the defense department's interests. In FY-86, it is proposed to allocate 7.9 billion dollars to NASA (this will exceed this year's level by 5 per cent).

Data being published abroad, concerning the apportionment of defense department appropriations, is the most complete statement concerning the priorities in the financing of the U.S. armed forces' development, the missions they are executing and development trends (Table 1). From these it is seen that the U.S. administration and Reagan's reelection for a new term continue to increase the power of the strategic forces in all components of the TRIAD. For the "strategic forces" program in 1986, 29.9 billion dollars

Table 1. Distribution of Defense Department Appropriations by Major Programs
(In Billions of Dollars)

MAJOR PROGRAMS	FISCAL YEAR		
	1984 (Actual)	1985 (Estimate)	1986 (Draft)
STRATEGIC FORCES	26.1	27.8	29.9
GENERAL PURPOSE FORCES	100.7	120.6	132.1
RESEARCH AND DEVELOPMENT*	21.5	24.6	30.4
FORCES FOR TRANSPORTING TROOPS BY AIR AND BY SEA	5.5	7.0	8.0
MILITARY RECONNAISSANCE	20.0	25.1	27.9
ARMED FORCES RESERVES (INCLUDING NATIONAL GUARD)	12.2	15.7	16.9
CENTRALIZED REAR SUPPLY AND ARMAMENT REPAIR	23.4	24.4	26.5
TRAINING, MEDICAL SUPPORT AND MATERIAL-TECHNICAL OF PERSONNEL	43.3	33.1	35.6
ADMINISTRATIVE-MANAGEMENT ACTIVITIES	4.8	5.9	5.9
MILITARY AID TO OTHER COUNTRIES	0.7	0.5	0.5
TOTAL	258.2	284.7	313.7

* Excluding R&D work for weapon systems approved for production.

are being requested which is 7.6 per cent more than in the current year and exceeds by a factor of 2.3 the 1981 level when their modernization was begun. These resources are intended for the purchase of 48 MX ICBMs, 48 B-1B strategic bombers, construction of 13 OHIO-Class SSBNs, the modernization of KC-135A tanker aircraft, etc. Additionally, it is proposed to equip 160 B-52G bombers with cruise missiles by 1986, and by the beginning of the 90s, to develop a fundamentally-new strategic bomber. From 1984, in accordance with Reagan's Strategic Defense Initiatives, known to the world as the "Star Wars" program, work was significantly accelerated on the creation of an anti-satellite and space weapon systems and, in particular, the anti-missile

defense system with space-based elements, widely disclaimed by the American press. Along with the offensive components of the strategic forces, great significance is being attached to the further improvement of a strategic command, control, communications, and intelligence (C³I) system based on the use of new scientific achievements.

Recently, the U.S. military-political leadership has been paying the most attention to the "general purpose forces" program. In FY-86, it is proposed to spend 132.1 billion dollars (higher than the current year by 9.5 per cent), which comprises more than 40 per cent of the total defense department appropriations. These resources are focused on the support and technical outfitting of the Army, Air Force, Navy and Marines. Paramount significance, as in previous years, is attached to the developemnt of new weapon systems and an increase in force combat readiness.

According to American press data, among the main programs, the role of "Research and Developement" programs is increasing the most in the allocations of the U.S. Department of Defense appropriations. For FY-86, the administration requested 30.4 billion dollars, i.e., more than for 1985 by 23.6 per cent, for carrying out scientific research and experimental design work (R&D). The allocated resources will be used for the R&D of an air defense system with space-based elements (3.7 billion dollars), MX ICBMs (0.8 billion dollars), MIDGETMEN (0.6 billion dollars) and submarine-based TRIDENT-2 ballistic missiles (2.2 billion dollars).

While continuing to increase the general purpose forces' potential, the U.S. Defense Department's leadership is accelerating the development of a new Air Force fighter, a helicopter for the Army, a new multi-purpose nuclear submarine, an advanced air-to-air missile and many other weapon systems. The results of the research are intended for the long-term and are still another confirmation of the United States' striving for military and technical superiority over the Soviet Union.

A substantial increase in appropriations in FY-86 is being requested also for the following main programs: "forces for transferring troops by air and sea" (by 14.3 per cent), "military reconnaissance and the development of a C³I system (11.2 per cent), "centralized rear supply and armament repair (8.6 per cent).

The functional structure of the defense department's budget shows a continuing increase in the power of the U.S. armed forces as instruments for conducting policy from a "position of strength." (Table 2) It is especially clear that the striving is manifested in the advancing rate of growth of R&D appropriations. In FY-86, an increase of 25.7 per cent in resources for these purposes are being requested bringing their total sum up to 37.7 billion dollars (30.0 billion dollars in the current year). Appropriations for conducting long-term development have the highest rate of growth. Next year they will exceed the FY-85 level by nearly a factor of 2 and will be more than 7 times that of 1981. The speed-up of the building of a wide-scale anti-missile defense system with space-based elements is the principle cause of this. Resources were significantly increased and allocated for development in the area of C³I. The largest part of the appropriations being requested by the

administration for conducting R&D is directed at the Air Force (nearly 40 per cent) and the Navy occupies second place (29.7 per cent).

Table 2. Distribution of U.S. Defense Department Appropriations by Functional Designation (in billions of dollars)

APPROPRIATION ITEM	FISCAL YEAR		
	1984 (Actual)	1985 (Estimated)	1986 (Draft)
Combat training, personnel support, operation and repair of combat equipment, others	139.5	149.7	159.1
Purchase of weapons and combat equipment	86.2	96.8	106.8
Research and Development	25.6	30.0	37.7
Military construction and living support	6.9	8.2	10.1
TOTAL	258.2	284.7	313.7

Resources being allocated for the purchase of weapons and combat equipment, by foreign press estimates, will increase in FY-86 by 10.3 per cent and comprise the fabulous sum of 106.8 billion dollars, or nearly 34 per cent of the Pentagon's budget. By comparison, one can say that this is equal to the entire U.S. Department of Defense FY-77 budget. The rapid growth for purchases is connected with putting into the forces the newest weapon systems, mainly missiles and aviation equipment. In FY-86, it is intended to direct more than 42 billion dollars for the acquisition of aircraft and helicopters. This is about 40 per cent of all resources being spent for this purpose. It is planned also to allocate enormous sums for the purchase of missile weapons (19.1 billion dollars), combatant and auxiliary ships (11.4 billion), and radio electronic equipment (8.6 billion). Appropriations for other items will have a high rate of growth.

The distribution of the defense department's budget by armed forces branch (Table 3) provides for increasing the growth of appropriations for the Air Force (up to 110.1 billion dollars, an increase for the year of 10.2 per cent), resulting from the implementation of modernization programs for ground-based strategic offensive forces and also for strategic, tactical and military transport aviation. Resources being requested for the support and outfitting of the ground forces will grow in 1986 by 9.8 per cent (comprising 81.7 billion dollars), and of the Navy, by 8.7 per cent (104.8 billion). Air Force budget appropriations exceed the sum allocated to the other service branches and will reach 35.0 per cent of the Pentagon's budget. The Navy's relative

Table 3. Distribution of U.S. Defense Department Appropriations
by Armed Forces Branch

SERVICE BRANCH	FISCAL YEAR		
	1984 (actual)	1985 (estimate)	1986 (draft)
GROUND FORCES	68.6	74.4	81.7
AIR FORCE	90.8	99.9	110.1
NAVY	87.4	96.5	104.8
Defense Department headquarters and departments	11.3	13.9	17.1
TOTAL	258.1	284.7	313.7

significance in it is 33.4 per cent and the Army's, 26.0 per cent. The growth of expenditures for the development and purchase of weapons and combat equipment, their operation and repair, the combat training and material and technical troop support, is the basis for the growth of appropriations to each service branch.

It is planned to allocate in FY-86, 46.6 billion dollars for the purchase of weapons and combat equipment for the Air Force (Table 4). The annual growth is 11.4 per cent (4.8 billion). Their share of the Air Force budget will be

Table 4. Distribution of U.S. Defense Department Appropriations
for the Purchase of Weapons and Combat Equipment by Armed Forces Branch
(in billions of dollars)

SERVICE BRANCH	FISCAL YEAR		
	1984 (actual)	1985 (estimate)	1986 (draft)
GROUND FORCES	17.4	19.4	21.4
AIR FORCE	35.1	41.8	46.6
NAVY	31.5	34.1	37.4
Defense Department headquarters and departments	1.2	1.5	1.4
TOTAL	86.2	96.8	106.8

increased up to 42.3 per cent. In the make up of the purchases for this branch of service, 56.2 per cent will be for aviation equipment (26.2 billion dollars), including 11.6 billion for combat aircraft. Large sums will be allocated for the acquisition of 48 B-1B strategic bombers (5.5 billion dollars), 180 F-16 (3.4 billion) and 48 F-15 (2.1 billion) tactical fighters, 16 C-5B heavy military transport aircraft (2.3 billion), 12 KC-10A tanker aircraft (447 million), 8 TR-1 tactical reconnaissance aircraft (343.9 million), 33 T-46A trainers (206.1 million), etc.

In FY-86, it is intended to allocate to the Air Force 10.9 billion dollars (23.3 per cent of all Air Force appropriations for the acquisition of new equipment) for the purchase of missile weapons and space equipment. These resources are intended for the production of MX intercontinental ballistic missiles (48 units), BGM-109 ground-based cruise missiles (95), HARM anti-radar missiles (1715), AMRAAM air-to-air guided missiles (90), and MAVRICK air-to-ground missiles (350).

It is planned to project 2.8 billion dollars (10.4 per cent more than the current year) for the purchase of Air Force radio electronic and communications equipment.

Air Force R&D appropriations in the draft budget are established in the amount of 14.7 billion dollars (Table 5), which exceeds the 1985 level by 15.7 per cent. These expenditures' share of the Air Force budget is far more than in

Table 5. Distribution of U.S. Defense Department Appropriations for R&D by Armed Forces Branch (in billions of dollars)

SERVICE BRANCH	FISCAL YEAR		
	1984 (actual)	1985 (estimate)	1986 (draft)
GROUND FORCES	3.7	3.8	4.6
AIR FORCE	11.6	12.7	14.7
NAVY	7.5	9.2	11.2
Defense Department headquarters and departments	2.8	4.3	7.2
TOTAL	25.6	30.0	37.7

the other services' budgets. In FY-86, it comprises 13.4 per cent of Air Force allocations and about 40 per cent of all defence department resources allocated for R&D. With these resources, R&D will be conducted on the MX ICBM, the AGM-86B air-launched cruise missile, the B-1B strategic bomber, MIDGETMAN ICBM, the STEALTH program, an advanced tactical fighter, and improved F-15 and F-16 fighters.

Naval appropriations for the purchase of weapons and combat equipment is estimated in FY-86 at 37.4 billion dollars (33 per cent of the Navy's budget). Compared to the current year, they will increase by 8.7 per cent.

In FY-86, 11.4 billion dollars (30.5 per cent of the Navy's budget are being requested for completing ship building programs. By means of these resources, 23 ships will be built (the next OHIO-Class SSBN, 4 LOS ANGELES-Class nuclear submarines, 3 TICONDEROGA-Class guided missile cruisers, and others), and 5 combatants and auxiliary ships will be re-equipped.

For the purchase of naval aviation equipment in FY-86, it is proposed to spend 12.1 billion dollars, that is 11 per cent more than in 1985, and 7 billion of this will be spent immediately for the production of various types of combat aircraft. Of this sum, resources are being allocated for the acquisition of 84 multipurpose F/A-18 (2.7 billion dollars), 18 F-14 TOMCAT carrier aircraft (801.8 million), 46 AV-8B short or vertical take-off and landing aircraft (979 million), 12 EA-6B EW PROWLER aircraft (479.3 million), 9 P-C3 ORION shore-based patrol aircraft (486.5 million), 6 carrier-based A-6E and F INTRUDER attack aircraft (214.2 million), 6 E-2C HAWKEYE AWACS and others.

Appropriations for purchasing missile weapons for the Navy will be increased significantly (by 32.4 per cent compared to 1985), and they will reach 4.9 billion dollars. It is planned to spend the main part of this sum for the acquisition of 1316 STANDARD air defense guided missiles (857.9 million dollars), 249 TOMAHAWK sea-based cruise missiles (734 million), 265 PHOENIX guided missiles (381.9 million), 1872 SPARROW guided missiles (368.7 million), 395 HARPOON anti-ship missiles (314.9 million), 904 HARM guided missiles (258 million), 1500 MAVRICK guided missiles (194.3 million), 500 HAWK air defense guided missiles (140 million), 1220 SIDEWINDER guided missiles (93.8 million), 800 STINGER air defense guided missiles (59.4 million), 4782 TOW-2 anti-tank guided missiles, 1304 HELLFIRE anti-tank guided missiles, etc.

For the purchase of naval radio electronic and communications equipment, 2.5 billion dollars are being requested. This is 25 per cent more than in the current year. It is proposed to expend 11.3 billion dollars (this exceeds this year's level by 21.5 per cent), for conducting Navy R&D work in FY-86. Two point two billion is intended for the TRIDENT-2 submarine ballistic missile development program. For the creation of new and the improvement of existing tactical weapon systems, 6.2 billion dollars will be spent.

Appropriations for Navy combat training and material and technical support in FY-86 will remain, for the most part, at the current year's level, 24.8 billion dollars (24.2 billion in 1985).

Resources allocated to the Navy for military construction will increase in 1986 by 24.9 per cent and will reach 2.2 billion dollars.

For the purchase of armament for the Army, appropriations are being requested in FY-86 on a scale of 21.4 billion dollars (26.2 per cent of this service's budget). Compared to the current year, they will grow by 10.3 per cent, which results, primarily, from the significant increase of resources for the

acquisition of artillery and infantry armament and tracked combat vehicles, helicopters, missiles, radio electronic and communication equipment.

It is planned to purchase 840 M1 ABRAMS tanks (2,204.3 million dollars), 716 M2 BRADLEY infantry fighting vehicles and M3 combat reconnaissance vehicles (1,063.1 million), 117 M247 SERGEANT YORK self-propelled anti-aircraft guns, 79 UH-60A BLACK HAWK multi-purpose helicopters (466 million), 114 AH-64 APACHE fire-support helicopters (1,233 million), 48 CH-47 transport-landing helicopters (396.6 million), 585 PATRIOT air defense guided missiles (983.4 million), and 72,000 missiles for the MRLS (548.8 million). For equipping forces with PERSHING-2 missiles, 382.2 million dollars are being allocated. Significant sums are being directed to acquire 20,100 TOW-2 anti-tank guided missiles (248.9 million), 6,576 HELLFIRE anti-tank guided missiles (250.7 million), 3,439 missiles for the transportable STINGER air defense batteries (304.1 million). It is planned to appropriate 3.3 million dollars for the purchase of radio electronic and communications equipment.

For continuing Army R&D programs in FY-86 , 4.6 billion dollars are projected to be spent (21 per cent more than in the current year).

For Army military construction 2.1 billion dollars are being requested (a growth for the year of 31.2 per cent).

Resources going for Army combat training and material/technical support are expected to increase by 12.5 per cent (up to 16.0 billion dollars).

The FY-86 defense department budget is graphic evidence of the adventurist course of the military-political leadership of that country for speeding up the arms race. More than 90 per cent of the defense department's appropriations are being directed toward military purposes.

The ring leaders of the military-industrial complex, and the administration, with President Reagan leading, are attempting to push the world to the edge of a nuclear catastrophe, are conducting the preparation for "star wars," are raising the aggressiveness, adventurism and hegemony to the rank of state policy, while directing its point, primarily, against the USSR and the other countries of the socialist commonwealth.

COPYRIGHT: "Zarubezhnoye voyennoye obozreniye," 1985

9355

CSO: 1801/25

FOREIGN MILITARY AFFAIRS

TACTICS: U.S. INFANTRY PLATOON -- ALL-ROUND DEFENSE

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 8, Jul 85 (Signed to press 7 Aug 85) pp: 33-34

[Article by Lt Col I. Aleksandrov; "U.S. Motorized Infantry Platoon in the Perimeter Defense"]

[Text] The U.S. military leadership, while continuing to build up the combat power of the units and subunits and detachments, also devotes a great deal of attention to improving their combat tactics. As emphasized in field manuals, modern warfare will be characterized by the massive use of the forces and resources of the belligerents, by abrupt changes in the situation, and by the necessity to make corresponding decisions rapidly. They state that personnel must be prepared constantly to conduct both offensive and defensive operations.

American military specialists, who regard defense as a necessary form of combat activity, do not exclude the possibility of conducting perimeter defense, which, in their opinion, is organized to prevent enemy penetration to important objectives (terrain), during an envelopment when separated from the main force and, in a number of cases, is designed to pin down the enemy in his rear area. Special attention is devoted to the lowest tactical units whose properly-organized defense will largely predetermine success in a forthcoming battle.

In military specialists' evaluation, the existing variations of arranging a perimeter defense for a motorized infantry platoon (all squads occupy positions on the perimeter, two squads on the front line and one on the second front in the rear) do not meet the requirements for conducting this type of defensive activity. As a result of experiments and training exercises, it has been proposed to arrange the formation like a trefoil which, it is believed, provides maximum utilization of available firepower. The key element of this formation is placing the squads at an angle of 120° with each other which creates three equal sectors of fire (Fig. 1).

Figure 2. Placement of Rifle-
men in a 2-man Position. (Var-
iation)

On the whole, as emphasized in the foreign press, the motorized infantry platoon may occupy a position 300-350 m in width and 250-300 m in depth, having created a zone of solid fire in front of the FEBA to a depth of 1,000 m

and having provided the capability to crossfire and flanking fire on the enemy in any sector of the defense. At the same time, it is noted that accomplishing the mission will depend largely on the correct use of terrain, mutual support of the squads, a coordinated system of all rifle and anti-tank fires, as well as troop morale.

COPYRIGHT: "Zarubezhnoye voyennoye obozreniye," 1985

9355

CSO: 1801/25

FOREIGN MILITARY AFFAIRS

TACTICAL POL TRANSSHIPMENT POINT FOR RAPID DEPLOYMENT FORCES DESCRIBED

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 8, Jul 85 (Signed to press 7 Aug 85) pp: 41-44

[Article by Col I. Danilchenko and Col V. Bychkov, Candidate of Technical Sciences; "Tactical POL Transshipment Point"]

[Text] In U.S. military strategy, special importance is given to preparing for so-called "limited" nuclear war, which the political-military leadership presents mainly as a war far from United States territory. Having unleashed aggression in Viet Nam in 1964, the country's armed forces command faced a number of problems in the area of material-technical support of major amphibious operations. One of these was delivery ashore of large amounts of petroleum products (POL). This problem became still more acute in connection with the creation of American "Rapid Deployment Forces."

Studies of the problems of providing fuel to forces, especially during amphibious operations, were initiated in a 1975-78 investigation which showed that the army had insufficient special equipment for receiving and storing large amounts of liquid fuel during combat activities in a poorly equipped theater. In Western Europe and South Korea, where networks of fixed military pipelines and fuel storage have been constructed, supplying the troops with petroleum products, as American military specialists believe, will not be particularly difficult. At the same time, they have reached the conclusion that it is necessary to create a special system of equipment for receiving fuel from tankers and storing it during troop actions in regions such as Africa, the Middle East and Southeast Asia.

As reported in the foreign press, at the present time, part of the supply of materials, equipment and weapons specially designated for the Rapid Deployment Forces is maintained on stores ships located in the Indian Ocean. Selection of such a means of supplying them is dictated by the demands for high combat readiness of the units and subunits. Maintaining stores on ships is more economical but also demands the development of special equipment for off-loading. One solution, in foreign specialists' opinion, may be the deployment of tactical marine terminals (TMT) to ill-equipped theaters to discharge, receive and store liquid fuel (sometimes they are called temporary fuel unloading and storage points).

A TMT allows tankers of up to 25,000-ton displacement, lying offshore (at buoys) at a distance of not more than 1.5 km, to off-load fuel through floating rubberized or underwater steel pipelines to temporary POL storage on shore which can hold 8,000 m³. The depot accomplishes fuel storage and distribution with tank trucks or other tanks mounted on trucks. It can receive, store and distribute three types of fuel--jet fuel, mogas and diesel.

Setting up the point requires an area of 0.6 km² and 72 hours. The whole complex of equipment, the weight of which is 700 tons, is air-transportable and can be deployed to a designated region on C-130 and C5A transports. For ground transport of the system, according to reports in the foreign press, in one training exercise four railroad cars and 34 semi-trailers were required.

The TMTs contain both anchorage and shore equipment. The ANCHORAGE EQUIPMENT includes mooring terminals (five), steel and rubberized pipelines, motorboats, diving apparatus, pulleys, and winches, depth measuring devices for offshore waters, anchors, weights, lines and buoys. A mooring terminal is a steel welded buoy with a diameter of about 4 m, a 22.7 anchor and connecting lines.

The steel pipeline can be laid on the bottom to a length of up to 1.6 km. It is made up of 150 mm-diameter pipes 6.1 m long, each of which weighs either 136 or 172 kg, depending on wall thickness (5.6 or 7.1 mm respectively). These pipes have negative buoyancy and therefore do not require special weights to hold them on the bottom.

A hoseline 1.6 km long permits off-loading on the surface. It is made up of separate hoses 150 mm in diameter. The hoses are made of several layers: the interior is hermetically sealed, the middle is for strength, and the outer for protection. The thickness of the hose walls is 5 mm. Stretching out the hoseline is mechanized and is performed by a special apparatus which has two reels, a diesel motor, a winch, and control panel. The hoseline and telephone cable are wound on one reel, the tow cable is on the other. This apparatus weighs 8 tons and is 3.7 m high.

The TERMINAL's SHORE EQUIPMENT includes collapsible reservoirs, pumping units, a full set of rigging necessary to insure its normal operation, and fire suppression equipment.

The collapsible tanks (42 of them in all, each with a volume of 190 m³) are for fuel storage. A tank is made from nylon-reinforced polyurethane. It has four pipes: two for draining and filling, with a diameter of 100 mm, a ventilating pipe with valve regulated to an overpressure of 0.0025 kg/cm², and a drainpipe for draining sediment and water. Along the perimeter of the tank are 18 handles for carrying it when empty (weight, 312 kg). A filled tank is 21 x 7.3 x 1.7 m.

Pumping equipment sets (eight altogether) are for transferring fuel. Each of them (with a capacity of 136 m³/hr) has a pump and a diesel motor mounted on a metal frame. According to reports in the foreign press, in addition to the indicated units in the onshore equipment, it is proposed to have more mobile equipment, mounted on single-axle carts. Such a unit (2.6 x 1.45 x 1.42 m) is

equipped with a gas engine using 3 liters of gas per hour and having a capacity of 80 m³/hr. under a 60 m head.

Fuel distribution equipment includes filter-separators, hoses with quick assembly, spill-preventing connectors for connecting to overflow pipes, dispensing spigots, etc.

Hoses with a diameter of 150 mm (overall length of 11.3 km) are intended to distribute fuel from the water exit point to the tanks and for inter-connecting the latter. The hoses are stored and transported rolled on reels. It is noted in the foreign military press that in order to achieve unitization and weight reduction of the TMT, using 100 mm-diameter hoses has been proposed.

For convenience in training, storage, and setting up the onshore equipment, the TMT is broken into modules (seven), each of which has six tanks, hoses, pumping units, and filter/separators. The overall capacity of the reservoirs of one module is about 1,140 m³. There are reports that work is underway to study the possibility of transporting the module equipment in standard containers. In the future, it is proposed to increase each module by another two reservoirs and raise their capacity to 1,514 m³. Then the total number of reservoirs will be 56, and their total capacity will be 10,600 m³. American military specialists believe that the future TMTs should have still greater capacity.

As emphasized in the foreign press, TMTs will be deployed to appropriate regions on ill-equipped shores where mooring facilities have been destroyed as a result of combat activities. Also, deployment is possible when mooring facilities remain but cannot be used because of a complex combat situation. Deployment and exploitation of the TMT are executed by a port engineer construction company and a pipeline and fuel supply company.

The port engineer construction company conducts a reconnaissance of the beach and water area selected for the TMT, plans the layout and prepares ditches with berms for emplacing the shore storage, constructs entrance roads, establishes mooring facilities, emplaces pipelines to the anchorage and maintains the anchorage equipment while it is in use.

The pipeline and fuel supply company emplaces the reservoirs in the prepared sites, sets up the pumping equipment, couples the rubberized hose lines of the shore storage to the pipeline in the water, puts in the intra-depot pipelines and fuel distribution equipment. Further, it receives the fuel at the depot, stores and distributes it, takes security, defense and fire prevention measures.

The best regions for deployment are considered those with a gently sloping beach, and where the land area provides natural cover and concealment for the depot.

After measuring depth and reconnoitering the sea bottom with divers in the direction to be followed by the pipeline, the mooring terminals are set up. A block, through which a line from the winch is reeved, is mounted on the buoy

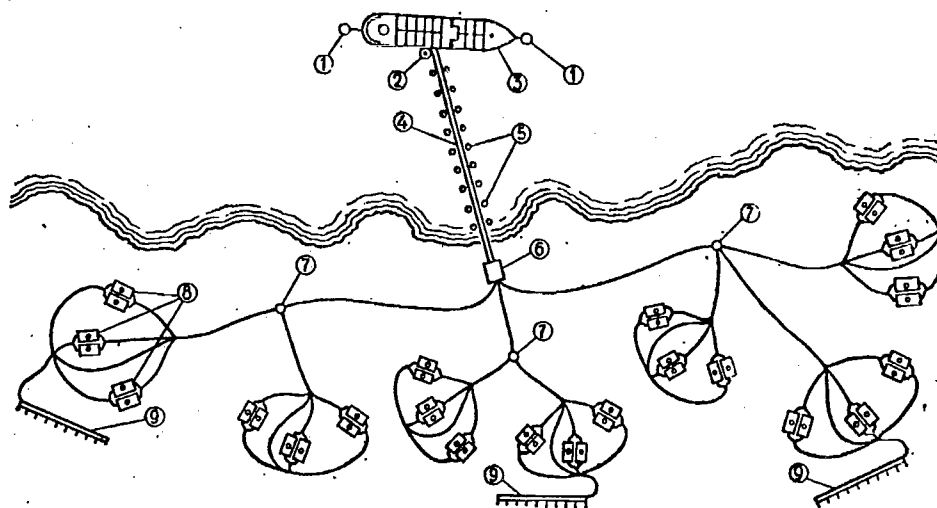
designated for securing the end of the pipeline. Selection of the type of pipe, as noted in the foreign press, is determined by a number of factors. In the case where the beach and bottom are gently sloping and even, and the intensity of ship traffic in the selected region is great or enemy activity in the air or sea are possible, the steel pipeline is preferred. For hauling it from the shore and ensuring favorable working conditions upon connecting the sections at the water's edge, wooden decking is built. The first pipe is secured to the line reeved through a block on the buoy, then the winch is turned on and pulls the pipe section to the sea. As the section enters the water, hauling stops, a second section is attached to the first, and the winch is turned on again, etc. The end of the first section is plugged to prevent water, sand and other extraneous matter entering.

When extension has been completed, divers remove the line from the pipeline, remove the plug, and replace it with a submerged hose, the length of which must be not less than 2.5 times greater than the depth of the sea at that place. The upper part of the hose, where the valve and plug are mounted, is secured to the mooring buoy. It must be long enough to be taken onboard the tankers and attached to the discharge valve. A telephone cable is extended along with the submerged pipeline and is secured to the mooring buoy. Once the pipeline is laid, it is blown out with compressed air, the end valve is closed and the plug inserted, after which it is considered ready for operation.

If the beach and bottom are uneven and rocky, but the volume of shipping is small and enemy action unlikely, then, the specialists believe the floating hoseline is preferable. A line is drawn into the sea from a small reel. The hoseline and telephone cable, wound on a large reel, are attached to it. The forward end of the hoseline with valve and plug is attached to the mooring buoy. An electric power line and lights are laid alongside the hoseline to mark the hoseline during periods of darkness. Besides that, floats (190 liter buoys) are placed at 100 m intervals, and every 200 m it is secured by a cable to a weight or anchor on the sea bottom.

Simultaneously with the work in the water, the collapsible tanks are being set up on shore. A separate area is dug for each of them (the depth or the height of the berms is not less than 1.8 m). It is believed that the distance between tanks should be at least 45 m. Six tanks constitute a group. Groups are inter-connected and connected to the hoseline with hoses. Additionally, a pumping station (two or three pumps) is connected to the hoseline. In areas of the depot which afford good approaches, three fuel dispersing sections are established (see figure).

A tanker which has arrived for unloading is moored to at least two buoys. A hose is hoisted on board which is attached to the operating manifold. Telephone communications are established between the tanker and the on-shore storage. The tanker's pumps are used to pump fuel to the beach. When necessary, the on-shore pumps are used also. Various types of fuel are pumped through the system by placing spherical separators between them. The fuel which has arrived on shore is stored and distributed to requesters according to need. The depot may be used both during amphibious landings and during combat actions further into the theater.



Typical Layout of a Tactical Marine Terminal

- | | |
|---|-------------------------------|
| 1. Mooring buoys. | 5. Floats. |
| 2. Buoy for securing the end of the pipeline. | 6. Pumping station. |
| 3. Tanker. | 7. Pumps. |
| 4. Floating hoseline. | 8. Collapsible tanks. |
| | 9. Fuel dispensing equipment. |

American military specialists believe that the Tactical Marine Terminal, despite its current faults (heavy weight and large volume of the equipment, vulnerability of the collapsible tanks, complexity of laying the pipeline in the sea, etc.), can accept and dispense the necessary quantity of fuel to satisfy the demands of American forces during combat in an ill-equipped theater.

COPYRIGHT: "Zarubezhnoye voyennoye obozreniye," 1985

9355

CSO: 1801/25

FOREIGN MILITARY AFFAIRS

BRITISH, JOINT AIR DEFENSE TRAINING DISCUSSED

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 8, Jul 85 (Signed to press 7 Aug 85) pp: 50-52

[Article by Lt Col G. Veselovskiy; "Exercise ELDER FOREST"]

[Text] Taking into account the peculiarities of the geographical location of Great Britain, and the fact that in NATO its territory is considered as a large sea and air lines of communications center, necessary for carrying out the massed transfer of personnel and equipment, and also other means of materiel-technical support for troop combat operation from the USA to Western Europe, this aggressive imperialistic bloc's command is paying a great deal of attention to strengthening the air defense of the British Isles.

As the foreign press reports, for solving this mission, the independent 4th PVO, the so-called Atlantic zone was created within the framework of NATO's centralized PVO system. It encompasses the territory of Great Britain and the islands adjacent to it (including the Shetlands, the Hebrides and Faeroes) and the water areas surrounding them. The responsibility for organizing and supporting the zone's air defense is entrusted primarily to the English Air Force Home Command--Great Britain's Air Force Strike Command which was by 1974, upon the initiative of the English government, transferred to NATO and is directly subordinate to the supreme commander of the bloc's Combined Armed Forces in Europe.

The zone's active PVO resources include the PHANTOM and LIGHTNING fighter-interceptors, the BLOODHOUND-2 and RAPIER air defense systems. A wide network of various command-and-control points and centers, and also detached radar sites are deployed for the command-and-control of these systems. Judging by reports of the foreign press, Great Britain's Air Force Command is carrying out a number of measures to strengthen this PVO system further. In particular, the fighter aircraft fleet is being improved: series production of the TORNADO F-2 fighter-interceptor has begun, and soon it is planned to equip the first squadron with them; work on the development of the NIMROD AEW-3 new long-range early warning [DRLO] and control aircraft is being carried out, etc. In addition, new anti-aircraft missile subunits are being formed; for example, at the beginning of 1985, the newly-formed 66th squadron equipped with the RAPIER anti-missile system was introduced into a ground-based defense regiment of the country's air force. It is planned to deploy

two other such squadrons (the 19th and 20th). The system for controlling the forces and resources is being improved.

An important role in the plans for increasing the potential and combat readiness of units and subunits, and the entire PVO system is assigned to various exercises. The most important of these, according to Western military experts' opinion, is the ELDER FOREST exercises. They are conducted once every two years by a large number of forces and resources.

As is noted in the foreign press, the scale of the exercises of this type is continually growing; the largest of them was ELDER FOREST-84. It was conducted from 5-7 March, 1984, on the territory and in the air space of Great Britain. Besides the Atlantic PVO zone's forces and resources, other units and subunits of NATO's Combined Air Forces were drawn to it. Its primary purpose was the comprehensive verification of the combat readiness and capabilities of Great Britain's PVO system to repel massed enemy air raids.

Aviation units and subunits of the air forces of nine NATO countries (Great Britain, USA, Denmark, Belgium, Canada, the Netherlands, France, FRG, and Norway), and also the ground-based PVO forces and resources (in all, up to 900 combat aircraft and more than 100 air defense missile installations) participated in the exercise. The commander of the English Air Forces in Great Britain, carried out the general control of the exercise. Its participants were divided into "defensive" and "offensive" sides: the first conducted a defensive air operation, and the second, an offensive one.

The composition of the forces and equipment participating in the defensive air operation included seven squadrons of fighter-interceptors of the English Air Force Home Command (LIGHTNING F-6, PHANTOM FG-1 and PHANTIM FGR-2). They were reinforced by a squadron of F-104G aircraft from the Danish Air Force (transferred to the Binbrook English Airbase) and by F-14A U.S. carrier-based fighters (which operated from the carrier INDEPENDENCE) and a training squadron of F-5E aircraft of the U.S. Air Force (relocated to Alconbury Air Base, Great Britain). VICTOR K-2 and VULCAN K-2 tanker aircraft supported the combat operations of the English fighters. In addition, subunits, equipped with the anti-aircraft missile system, BLOODHOUND-2 and RAPIER carried out the air defense of airbases, missile launch sites, radar reconnaissance systems and other targets dispersed on the British Isles.

Combat-training aircraft HAWK, intended for conducting aerial combat with low-flying targets, were used to reinforce individual targets' PVO for the first time for the activities of a similar branch. They were equipped with the AIM-9L SIDEWINDER air-to-air guided missile and operated in close cooperation with the PHANTOM fighter-interceptors.

For increasing the detection range of the air "enemy" and the command-and-control of PVO forces and tactical aviation, the long-range early warning radar aircraft SHAKELTON AEW-2 of the British Air Force and the E-3A AWACS of the NATO command were used.

The "raiding" side was represented by subunits for the air forces of Belgium (MIRAGE-5BA and F-16 aircraft), Canada (CF-104), France (MIRAGE-5F, MIRAGE-4,

and the JAGUAR), FRG (Alpha Jet, F-4F, and the TORNADO) and also the British Naval Air Force (HUNTER and CANBERRA). Aircraft of the air forces of Great Britain (JAGUAR, LIGHTNING F-3, TORNADO GR-1, BUCCANEER CANBERRA B-2), Denmark (F-35XD, F-16), Norway (F-16) and the USA (F-111, A-10A, and RF-4C) reinforcing them.

During the exercise, its air force delivered several massed strikes on the airfields and other important military and economic targets located on the territory of Great Britain. After working out the questions of the breakthrough of the PVO system and the conditional destruction of assigned targets, the aircraft carried out practice bombing, firings from on-board cannons, and rocket launches on the aviation firing ranges located in the southern part of England and in Scotland. As it was reported in the foreign press, the crews of combat aircraft received a great deal of practice in working out the afore-mentioned missions. The combat crew personnel of anti-aircraft missile systems and PVO fighters acquired definite experience in the detection, interception and destruction of aerial targets.

In the English journal DEFENCE, it was noted that the exercise ELDER FOREST-84 was conducted simultaneously with the large exercise TEAM WORK-84, by the combined NATO navies in the Atlantic and Northern European TVD. Thus, the missions for protecting the bloc's ship formations, operating within its zone of responsibility, against air attacks, were accomplished by the forces and resources of the Northern PVO zone.

By the results of such exercises, Western military experts draw conclusions concerning the combat potentials and readiness level of aviation, the readiness level of air defense missile troops and their command-and-control organs, and they bring out existing deficiencies and work out measures for eliminating them.

COPYRIGHT: "Zarubezhnoye voyennoye obozreniye," 1985

9355

CSO: 1801/25

FOREIGN MILITARY AFFAIRS

AIR-TO-GROUND ANTI-RADAR MISSILES

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 8, Jul 85 (Signed to press 7 Aug 85) pp: 52-56

[Article by Col B. Mikhailov; "Air-to-Ground Anti-Radar Guided Missiles"]

[Text] In the process of constantly expanding the arms race, which the member states of the aggressive imperialistic NATO bloc are doing in order to achieve military superiority over the Soviet Union and the other socialist states, the existing airborne means for conducting electronic warfare are being improved and new resources are being created. The foreign press notes that, along with developing electronic suppression devices and outfitting the majority of combat aircraft and helicopters with them, increased attention is also being paid to anti-radar missiles. They are considered to be an important means of firing upon and destroying emitting targets, including a radar which is part of air defense artillery and missile facilities. It is the opinion of foreign military specialists that the basic advantage of such missiles is that they cause an untimely cessation of radar operations (as is the case in using electronic suppression equipment) and cause the radar to be destroyed or significantly damaged to the extent that it has to be replaced or will require extensive repairs.

Information will be presented below concerning in-service and projected models of foreign anti-radar air-to-surface guided missiles (their specifications are given in the table). Judging from the reports in the Western press, the U.S., where three types have been developed: SHRIKE AGM-45, STANDARD-ARM AGM-78, (with several modifications), and the HARM AGM-88, has given priority to creating such guided missiles.

The SHRIKE missile was created in the early 60s. Since it was put into service in 1964, more than 24,000 of these missiles have been delivered to the U.S. Air Force and naval aviation. This guided missile, has an aerodynamic rotating wing configuration, consists of four basic components: the passive radar-homing head, the munitions section, the guidance system and the engine.

The seeker is a single-pulse type and is not intended for frequency adjustments while the missile is mounted on the carrier aircraft in flight. Hence, the missile can be used only against targets which operate within a

specific frequency range. It is possible to attack diverse kinds of targets

PRINCIPAL TACTICAL AND TECHNICAL SPECIFICATIONS OF ANTI-RADAR MISSILES

Missile Name and Designation and Nation-Developer	Launch wgt.	Maximum	Missile	Principal Carrier Aircraft (Helo Carriers)
	-----kg	Range, km	Dimensions, cm	
	Warhead wgt. (Type)	Maximum Speed, Mach	Length X Body Diameter X Wing Span	
			Guidance System	
SHRIKE AGM-45A, USA	177	50	305 X 20 X 90	F-4, F-105
	66 (Frag-HE)	3	Passive Radar	A-6, A-7, F-111

by installing radar homing heads with varying operating ranges on SHRIKE missiles. It has been reported, in particular, that in order to do this, thirteen variants of the radar head have been created, which collectively are capable of covering the frequency ranges of the kinds of modern radars used in anti-aircraft artillery and missile systems.

Three kinds of interchangeable warheads (two fragmentation-HE and one signal) can be mounted on the missile. They have identical dimensions and weights (66 kg). When detonated, the fragmentation-HE warheads form about 20,000 cube-shaped fragments, which provide an angle of dispersion of about 40°. The warhead's radius of destruction is approximately 15 m. The signal warhead is packed with white phosphorus. The moment it is activated it forms a white cloud which serves as a reference point for other aircraft conducting bombing activities. An influence exploder detonates the warhead over the target.

The guidance system component located in the central portion of the missile contains a powder generator, the rudder drives and a thermal battery. The missile is outfitted with a solid fuel engine (weighing about 75 kg). The fuel contains ammonium perchlorate and polybutadiene. The activating time of the engine is about 3 seconds and the total thrust is about 10,000 kg.sec.

The foreign press remarks that the SHRIKE missile was widely used in the aggressive war conducted by the United States in Southeast Asia. The missiles were basically used at altitudes of 2.5 to 3.5 km, with a launching range of about 15 km. Besides the U.S., these missiles are used in service in the Israeli Air Force and were actively employed by Israeli aircraft in the Near East against the neighboring Arab states' anti-aircraft missiles. During the Anglo-Argentine conflict over the Falkland (Malvinas) islands, Great Britain delivered a limited number of Shrike missiles deployed on Vulcan bombers.

Judging from reports in the foreign press, experience in using SHRIKE missiles in local wars has shown their relatively low effectiveness. Their greatest drawback is considered to be their pre-configured radar seeker, which preclude

them from being used on non-preplanned targets. Furthermore, another drawback of the missile is its inability to home on a radar if the latter ceases operating. Thus, the United States in 1966, began developing a more effective anti-radar guided missile called the STANDARD-ARM AGM-78, which was put into service in 1968.

The missile has a standard aerodynamic design. Several types of wide band radar homing heads with differing operating frequency ranges were made for it. The radar head section contains a device which stores target coordinates, making it possible to aim the missile even after the radar has been turned off. The missile is equipped with a powerful fragmentation-HE warhead (with a weight of more than 400 kg). The warhead inflicts damage by means of either an influence or contact exploder. In particular, it has been reported that maximum effect is obtained by deploying the warhead at a height of about 20 m. The guided missile's solid fuel engine has a booster and sustainer operational mode. The signal charge is positioned in the intermediate compartment, next to the warhead. After exploding it releases a smoke cloud that serves as a reference point for the bombing activities of other aircraft.

In foreign military specialists' opinion, the STANDARD-ARM has a very complex design and is too costly (its cost is almost three times that of the SHRIKE missile). Production of the STANDARD-ARM missile was discontinued in 1976, and a total of about 3,000 units were delivered to U.S. Air Force units. At the present time, the SHRIKE and STANDARD-ARM missiles are considered to be outmoded because of their inherent deficiencies, including, in particular, their slow flight speed, which allows the enemy to take countermeasures to break up an attack, as well as the lack of a seeker that can cover a sufficiently-wide frequency range.

In 1983, the U.S. Air Force and naval aviation introduced a new anti-radar missile called the HARM AGM-88 (High-speed Anti-Radiation Missile). In contrast to the SHRIKE and the STANDARD-ARM, in addition to ground and ship air defense radar guidance systems, it can destroy early warning and fighter guidance radars.

It is reported that the HARM, in comparison to previous American guided missiles, has greater speed, maneuverability and a more effective warhead. It has a standard aerodynamic design and externally resembles the SHRIKE. The HARM seeker, which operates in a wide frequency range, permits attacking various kinds of enemy equipment emitting radio-frequency signals.

The missile is equipped with a fragmentation-HE warhead, the detonation of which is accomplished with a laser exploder. The two-phase solid fuel engine of the missile is loaded with a low smoke-producing fuel, which greatly reduces the probability of detecting the missile's launch from the carrier aircraft.

Several methods for using the HARM are envisioned. If one knows ahead of time the radar type and what its probable deployment site, then the pilot, using on-board radio reconnaissance facilities or a detection receiver, can conduct target search and detection, and then, after homing head lock-on, the missile is launched. Furthermore, it is also possible to fire the guided missile at a

radar which has been detected by chance while in flight. The Western press notes that the long firing range of the HARM allows it to be used on a previously-reconnoitered target without seeker lock-on before the missile is launched. In this case, the seeker locks on the target at a pre-set range. If the target is not detected, the missile then self-destructs.

In recent years, the question of the necessity of arming combat aircraft and helicopters with so-called anti-radar missiles to protect them from short-range air defenses, has been discussed in the foreign press. It is believed that such missiles ought to have small weight and dimensions so that their use on small aircraft does not reduce the amount of weaponry intended to accomplish the primary objective. At the present time, the U.S. is working on such missiles, in particular the ADSM and the SIDARM.

The ADSM (Air Defense Suppression Missile) was developed from the STINGER air defense guided missile. The missile has a canard design and is outfitted with a combined homing head (passive radar and infrared) with the infrared head working within two ranges of the infrared spectrum. Judging from reports in the Western press, in the radar detection mode, the seeker can detect an enemy at a range of up to 10 km, and the main beam, up to 20 km.

The SIDEARM missile is a modification of the out-moded SIDEWINDER AIM-9C air-to-air missile, in which the infrared seeker was replaced by a radar seeker capable of homing on operating radar. The SIDEARM missile is seen as an intermediate variant of self-defense missile until a specialized missile for this purpose is developed. In particular, the foreign press notes that in early 1985, seven nation participants of the NATO bloc (USA, Great Britain, Belgium, the Netherlands, Italy and Canada) signed an agreement to develop jointly the new SRARM anti-radar missile (Short-Range Anti-Radiation Missile) for short-range fire.

Since 1969, British and French air forces and naval aviation have had the MARTEL AS.37 anti-radar missile in service. Its homing device works on fixed frequencies in several ranges and can assure damage principally to pulse radars. Before the MARTEL is deployed against a known type of radar, the the reconnaissance receiver's local oscillator is tuned to the specific frequency. The missile's power plant consists of booster and a sustainer solid fuel engines, one behind the other. The the sustainer engine's exhaust gas tube runs through the booster engine and connects to a nozzle fastened to the end plate. This same end plate contains the booster engine's four nozzels. The tail compartment of the missile contains the power pack, the system's guidance mechanism, and the rudder drives.

Since 1982, Great Britain has been developing a new anti-radar missile called the ALARM (Air-Launched Anti-Radar Missile), which is structurally an aerodynamic "rotating wing." This missile's passive radar seeker has a wide-band microwave receiver and a fixed antenna array. The homing head also contains a digital processor which is capable, in particular, of processing signals from the homing head and an inertial platform, but also of selecting target priority, processing control commands, and maintaining the flight path. The homing head's antenna cap is made of a new synthetic material which assures less weakening and distortion of the signal in comparison to ceramic

caps. The missile is equipped with a fragmentation-HE warhead which is detonated by an influence exploder.

Two methods of employing the ALARM missile are envisaged. In the first, the missile is launched from the carrier aircraft flying at a low altitude a distance of about 40 km from the target. Then, in accordance with the program, the missile climbs to the assigned altitude and changes to a horizontal flight path, and it is then guided into the side of the target. While in the flight path, the radar signals received by the homing head are compared to the standard signals of typical targets. After locking on the target signals, the missile guidance process begins. If the missile does not lock on the target radar's signals, then, in accordance with the program, it climbs to an altitude of about 12 km and once there, the engine shuts off and a parachute deploys. While the missile is descending on the parachute, the homing head conducts a search for radar signals and, after locking on them, the parachute is jettisoned and the missile glides into the target.

In the second method of employment, the homing head receives target designation from the plane's equipment, locks on the target, and only after that, is the guided missile released and aimed at the target selected by the carrier aircraft's crew. It is anticipated that the ALARM will be put into service in 1987.

At the present time, a new anti-radar missile named ARMAT is also being developed in France. According to reports in the foreign press, the missile externally resembles the MARTEL AS.37 and is close to it in dimensions and weight (the launch weight is 500 kg, length, 4.2 and the diameter of the body is 0.4 m). The missile's maximum range is about 100 km. It is planned to outfit the ARMAT missile with a passive radar homing head, a fragmentation-HE warhead and a solid-fuel engine. It is anticipated that the MIRAGE-2000 tactical fighter will be used as the carrier aircraft.

COPYRIGHT: "Zarubezhnoye voyennoye obozreniye," 1985

9355

CSO: 1801/25

FOREIGN MILITARY AFFAIRS

RADAR SYSTEMS USING FREQUENCY SEPARATION PRINCIPLE DISCUSSED

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 8, Jul 85 (Signed to press 7 Aug 85) pp: 56-60

[Article by Lt Col V. Pavlov and S. Grishulin; "Radar Systems Using the Frequency Separation Principle"]

[Text] In order to achieve military superiority over the USSR and the other countries of the socialist community, the imperialist NATO bloc's leadership is intensifying its efforts in the area of combat command systems, by planning to incorporate qualitatively-new equipment for air and space tracking which specifically employs the principles of frequency separation radar. To complete this task, foreign specialists are working on the creation of both bistatic radars, consisting of one transmitter and one receiver in different locations, and multistatic radars which utilize several transmitters and receivers linked together by wideband communications lines.

The foreign press notes that the first experimental radars developed in the U.S. and Great Britain in the 1930s, were primarily of the bistatic type, in which the transmitter and the receiver were separated by a distance equal to the distance to the target. However, the then practically-unattainable principle of radar synchronization under combat conditions spurred the development of technology to create separate elements in antenna systems, primarily antenna switchers, which promoted the wider development of so-called combined radars, which, up to the present, form the basis of almost all existing air and space control systems, such as NAIDG, GAIDG, BMEWS, SPACETRACK and others. In addition, the principle of using separate transmitting and receiving units continued to be developed intensively. As a result, semi-active radar homing heads for air defense missile systems were created, which, due to their joint operation with the ground component of air defense missile units, are classified in certain foreign publications as one type of bistatic radars with a variable base (referring to the distance between the receiving and transmitting sections).

Experience in using radar systems with separate elements mounted on mobile platforms was gained principally during the development of qualitatively new multi-position radars, the need for which, according to Western press reports, was created by the rapid development of electronic countermeasures as well as by the wide use of air defense guided missiles. In foreign specialists'

opinion, this type of radar under present conditions is practically the only way to provide a highly stable above-horizon radar field set up to provide real-time information on the air and space situation.

This is explained by the same multiposition radar construction principles, through which high survivability is achieved by placing them outside the killzone of active weapons, and the complexity of detecting the receiving units' location due to their passive operating mode. Besides this, such radars paved the way for a wider application of adaptive operating methods under active electronic countermeasures conditions through the optimal placement of their various elements, and the use of the most modern technological and design features for forming and processing complex radar signals.

It is believed that for multiposition radars to locate moving targets, they must make use of not only methods based on measuring the angular coordinates, distance and speed, as done by other types of radars, but also specific methods based solely on measuring distance, the sum or difference of distances, or doppler frequency shifts through correlational processing of the corresponding data. In this case, there is a significant increase in the probability of accurate target detection in the presence of artificial and natural interference, tracking accuracy increases, and additional information is obtained that is necessary for target identification and selection. A multiposition radar's zone of operation is determined by the relative position of the receiving and transmitting units.

The particular advantages of multiposition radar appear in situations in which the targets are arranged in a single line between the transmitter and receiver units, i.e., when the angle formed by two straight lines relative to the target and these units is equal to, or approaches, 180° . In a given situation, the signal-to-noise ratio rises significantly at the receiver input, which, in the end, leads to greater accuracy in radar measurements. A number of the multiposition radar's advantages are related to the fact that, as a result of the separation of the transmitter and receiver units, it is possible to combine the use of both continuous and pulsed signals whose duration can fluctuate within a broad range by varying their length and repetition rate and is based also on the conditions and the power required for resolution and accuracy.

The foreign specialists note that the main difficulty in the creating and operationally using multiposition radars is the requirement to process a significant number of radar measurements to avoid ambiguity. This requires a high degree of synchronization of the separate radar elements, the availability of broadband communication lines, and high-speed computers with large fixed and random access memories.

According to Western experts' assessments, the development of communications and data transmission technology, the creation of phased array antennas (FAA) with the ability to form a significant number of beams in several directions simultaneously, as well as the utilization of digital radar data processing equipment with new computer-based software, will create favorable conditions for building multiposition radar and putting them to use. Judging by Western

press announcements, the specialists are directing their present efforts mainly towards calculating the optimal structure of such radars, including the determination of the basing options for the receiver and transmitter units, the scanning algorithm for detecting and measuring the motion parameters of a large number of targets, and the practical application of triangulation, interferometry and data correlation.

One variant of a multiposition radar is the American radar developed in the late 1970s under the SANCTUARY program. Its transmitting unit, used for target illumination, is supposed to be placed on board a TR-1 aircraft patrolling well inside U.S. territory at an altitude of almost 10,000 m, while the ground receiver network is located in close proximity to the border.

The solid-state radar operates on a frequency of about 1,300 MHz and provides a continuous output power in the range of 1.7 kW. It can operate in both continuous and pulse modes with phase-code modulation. The transmitter antenna gain is 15 dB, providing a directional pattern 18° wide in azimuth and 21° in elevation. The transmitting antenna is used not only for target illumination, but also for transmitting part of the radiated energy to the receiver units, where it is used as a reference signal in the correlational processing of information. Scanning is accomplished by mechanical positional control of the transmitting antenna in elevation in a 70° (from -15° to $+55^{\circ}$) sector.

The receiving unit has a phased array antenna system which forms a partially directional pattern from two beams, each 6° wide. Electronic control of the radiation pattern occurs only in a 90° azimuth sector. The noise coefficient of the FAA input unit in an operating band of frequencies is about 3.5 dB. Apart from the main antenna, the receiving unit includes a side lobe suppressor antenna and an omnidirectional antenna with a special receiver used to receive the transmitter's reference signals.

As the Western press notes, plans for the receiver units of such radars call for the future wide use of antenna systems in the form of a flat FAA, which can simultaneously form multi-directional beams. Compared to existing antenna arrays, such antenna systems provide more effective coverage of the operational sectors through adaptive control of the receiving antenna's directional beam pattern. The use of multibeam antennas also provides more effective over-the-air synchronization of the receiver and transmitter units during the target detection process.

One such development is the American Sperry Company's antenna, which is a flat FAA consisting of 28 linear subarrays (9.1 x 0.31 m). each containing 18 dipole elements). It is estimated that this FAA will be able to form a multipath beam with the side lobes suppressed to a 35dB, making it possible effectively to detect a large number of air targets in the presence of both jamming and reflections off local objects and the earth's surface.

Judging by Western press announcements, tests of the SANCTUARY program's multiposition radar on a Pacific Ocean missile range showed the complexity of operating the receiver unit under conditions of interfering reflections from ground and water surfaces created by the arrival of the transmitter's signal

in the receiving unit along the main beam of the antenna's directional pattern. In American specialists' opinion, during target detection the signal level of interference reflected off the earth and local objects will depend not only upon the size of the earth's surface being illuminated by the transmitter in the general vicinity of the receiver unit, but also upon the speed and direction of the platform carrying the transmitter.

The SANCTUARY program is also looking into a simplified version of a multiposition radar, the Bistatic Alerting and Cueing (BAC) radar. BAC-type radars are to be used as a means for detection and target indication in short-range anti-aircraft missile and artillery sites. It is intended that transmitters onboard an E-3A distant warning and control aircraft of an AWACS or other configuration be used as the transmitting unit and portable units, operating jointly with very simple dipoles, as the receiving units. A separate channel will be used to isolate targets against the background of the earth's surface and local objects on which joint processing of all signals is to take place with adjustments made for doppler frequency shifts. In the event of successful testing of the BAC radar, the American command intends to equip combat subunits of active air defense units with these radars before the 1990s.

The SANCTUARY program also envisions the development of dual position radars designed to detect low speed air and ground targets. It is being developed under the BBT/TBIRD (Bistatic Technology Transition/Tactical Bistatic Radar Demonstration project. Flight tests of an experimental radar model, in which the platforms for the transmitter and receiver units were C-141 and C-130 military transports respectively, took place at a U.S. ground forces test range in Arizona.

A modified version of the AN/APD-10 sidescan radar serves as the transmitter unit and operates at a frequency of almost 10,000 MHz, with complex types of signals with linear frequency modulation and horizontal polarization. The transmitter's pulse strength is about 25 kW and the pulse repetition rate in the low speed target detection mode can reach 500 Hz, and almost 2,000 Hz in the moving target indication [MTI] mode. A flat antenna array serves as the transmitter unit, and the stabilization of its position is accomplished by controlling roll, pitch and yaw using a device consisting of three gyroscopes and three accelerometers.

The positioning of the airborne platform carrying the transmitter is controlled by an inertial navigation system, and direct control of the transmitter's operation is carried out by a special onboard computer. A monopulse reflector antenna is used in the receiver unit and is also stabilized in to roll, pitch, and yaw. In addition to an inertial navigation system, the transmitter platform's onboard equipment includes a radar mode control panel with an omnidirectional antenna for the reception of information sent along data transmission lines.

In order to improve target detection effectiveness in the dual-position radar being developed, plans call for the wide use of over-the-air synchronization of the receiver and transmitter elements by pre-matching the flight plans of the air platforms. A real-time exchange of coordinates is proposed as a way

to synchronize the operating modes of the receiver and transmitter units. In addition, after the requisite processing in a special computer, all data necessary for the control of the aircraft is fed into the data display in the cockpit.

The attainment of time and phase synchronization of the receivers and transmitters, using special high stability onboard generators, is considered a key task. In Western experts' opinion, it allows one to process radar signals by doppler frequencies and to receive information on the speed of moving targets. For this purpose, the airborne platform with the onboard receiver, in addition to receiving a transmitter's reference signal, must synchronize its maneuvering in such a way that its speed is compensated for by the speed of the airborne platform with the transmitter. For this, the Western press notes, it is possible to receive a zero doppler frequency while coprocessing in the receiver unit signals which had been reflected off that portion of the earth's surface painted by the transmitter and the reference signal arriving over data transmission lines from the transmitter to the receiver unit. This process, called tuning out interference reflected off local objects, allows bistatic radars effectively to detect moving and stationary targets against a background mixing reflections off the earth and local objects.

According to foreign press reports, the development of multi-position radars in NATO countries is aimed at designing radars with not only an air- or combination-based transmitter, but also of ground based units in which the receivers are positioned on the ground at various distances from each other. In particular, during experiments in Great Britain associated with the design of a ground radar, an S.264 air traffic control transmitter unit at London's Heathrow Airport was used. It operates on a frequency of about 600 MHz and can scan an operational sector and illuminate targets in a circular scan mode. The receiver unit of this dual position radar and its antenna system were located on the roof of a building in the center of London about 25 km from the S.264 radar. It operated jointly with an illumination transmitter and detected airborne targets within the unit's operation zone in the airport area.

It was reported that during the experiments, air targets, with an effective cross-section of 10-20 m² were detected with a sufficiently high degree of accuracy at distances in excess of 75 km. The structure of the radar signals formed by the S.264 radar was a 4 microsecond pulse sequence following with a variable repetition rate (in the 335-473 Hz range). In order to avoid using special communication lines between the transmitter and receiver location, English specialists have devoted much of their attention to solving the problem of time and phase synchronization of the receiver through the use of highly stable generators, whose oscillation frequency is periodically adjusted by the transmitter's signals. This adjustment is made when the transmitter beam of the S.264's antenna passes over the receiver's position during the scanning process. At that time, about 25 pulses reached the receiver, which were then used directly by the receiver unit's frequency synchronization device.

Target selection by azimuth angular coordinates and the necessary angular resolution along the azimuth is accomplished in dual position English radars

by forming a sufficiently narrow (approximately 30) directional pattern with the S.264 radar's antenna. A general-purpose microcomputer was used to solve operational algorithms, providing real-time processing of information arriving at a high rate.

Subsequently, the multiposition radar receiver units being developed in Great Britain are supposed to be equipped with FAA-type antennas which operate jointly with a digital unit to control the location of the main beam's directional pattern. Specifically, there are plans to utilize an interferometer FAA as one of the versions of this type of antenna to provide so-called high resolution of the targets which the receiver locates.

The American SPACER space control system's receiving and transmitting station antennas which, according to the design principles, are, in essence, one of the presently existing types of multi-position radar, serve as an example of an antenna which allows one to take advantage of the interferometric method of coordinate measurement. The system, comprising three transmitter and six receiver stations, is located along the 33rd parallel in the continental U.S. The central transmitter station is located at Kikapoo Lake (sic), Texas, and two others are at the Gila River, Arizona, and Georgian Lake, Alabama. The receiver stations are located in San Diego, California, Elephant Butte, New Mexico, Red River, Arizona, Silver Lake, Minnesota, and Hawkinsville and Fort Stuart, Georgia.

The transmitters operate in continuous mode and the central station's radiated power is about 1 MW; and the other two, 0.5 MW. According to Western press reports, the necessary detection barrier, whose depth in the north-south direction does not exceed 0.30, is formed by long-line multidipole arrays with a corresponding phase relationship between them. The receiving units' antenna design is the same as that of the transmitters'. The basic requirement is the phase shift constancy between the various receiver channels, or the ability to regulate it. The measured values of the phases are fixed, which permits determining the elevation angle of a target in the detection barrier being formed.

The processing of all the signals received in the system's control center in Dahlgren, Virginia, where angular coordinates are determined to an accuracy of about 0.010. The system uses special antennas to measure doppler frequency shifts. It was also announced that since SPACER went on line, more than 14,000 objects were catalogued with its assistance and it now tracks about 5,000 objects. The system is constantly being updated. Thus, during one of the latest stages, there was a significant change in the algorithm software with the introduction of two new PDP-11/60 computers.

The Multistatic Measuring System (MMS) is one example of a multiposition radar which is used in the testing of various weapons at the Kwajalein Range. It includes TRADEX and ALTAIR radars, forming the basis of the CREMS measurement complex; deployed on Roin-Namur Island (Marshall Island group in the Pacific Ocean) and two receiver units located on the islands of Illegini and Gellinam.

For optimizing the multiposition radars' modes, the TRADEX radar operates on a frequency of 1,320 MHz, and the ALTAIR on 415 MHz. As announced in the

Western press, two- and three-position systems operate on the basis of MMS. This is related to the fact that the receiver unit on Gellinam Island is capable of operating on frequencies of 1,320 and 425 MHz. While the unit on Illegini only operates on 1,320 MHz. In the opinion of foreign experts, a three-position system can distinguish targets and record their trajectory measurements. During the experiments, errors in measuring distance are only in the 4-meter range, and for speed, in the 0.1 m/s range.

The use of various forms of radar signals also facilitated the receipt of information for discrimination purposes. Specifically, the TRADEX radar made use of both continuous sequence of pulses and bursts of 32 pulses, which were processed in digital form by special processors. Diverse lines were used for communication between the positions. Analogue data transmission was carried out in a frequency range of 3.7-4.2 GHz. and digital between 7.1-8.0 GHz. The band width of one of the communication lines permitted transmission of radar information at a rate of 6 megabits/sec.

To work on targets passing through the MMS operations zone while it is operating in the continuous tracking mode, the angular coordinates of the antenna on Gellinam can be reoriented at a speed of $700^\circ/\text{s}$ with an acceleration of $550^\circ/\text{s}^2$. This antenna, and the one on Illegini are parabolic types 6.1 m in diameter. They are able to receive and process signals on two different frequencies with circular polarization. The antenna gain at 1,320 MHz is almost 36 dB, and at 425 MHz-24 dB.

All the abovementioned attests to the fact that the U.S. and other NATO countries are presently conducting intensive research in the area of design and development of radars using frequency separation principles for receiving radar signals. For this, their main efforts are focused on the choice of the best option for multiposition radar construction and the experimental verification of their operation under varied conditions and while solving a multitude of problems. In addition to that, the Western press notes that the introduction of combat systems using multiposition radar is expected no earlier than the early 1990s.

COPYRIGHT: "Zarubezhnoye voyennoye obozreniye," 1985

9355

CSO: 1801/25

FOREIGN MILITARY AFFAIRS

NEW DIRECTIONS IN DEVELOPMENT OF INTELLIGENCE COLLECTION SYSTEMS

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 8, Jul 85 (Signed to press 7 Aug 85) pp: 67-69

[Article by Capt 1st Rank (Reserve) K. Yakovleb; "New Directions in Development of Intelligence Collection Systems"]

[Text] In the imperialist military circles of the USA, and its allies of the aggressive NATO bloc, more and more attention is being devoted to integrating the latest scientific achievements into different areas of military affairs. As emphasized in the foreign press, contemporary scientific and technological developments have reached the point that it has become possible to create computer-based systems which imitate the human decision-making process for complex tasks (recognition, perception of the surrounding environment by direct and indirect means, simulating concepts, reasoning, decision making, etc) that cannot be formalized in some kind of systematic mathematical equation. There is not yet a clear definition of the concept of "artificial intelligence," but its modern methods are already suitable for use in various automated systems.

One of the most important areas for the practical application of artificial intelligence, in foreign experts' opinion, is in intelligence where its strengths lie in assembling and processing information about the enemy. They base their claim on the following facts.

The appearance of weapons with great range and destructive force imposed new requirements for reconnaissance support which primarily has given rise to the creation of complex systems for detecting and determining enemy targets' position. As a result, a significant overload is being noted in the computing centers which process reconnaissance information, which the stream of data flooded. They have proved to be incapable of producing for the command, analyzed information in a form of recognized situations and threats, reports and records. In complex situations, the processing resources actually restrict and reduce the possibility of employing weapons.

In the capitalist states' armed forces, this problem is solved by automating the collection, assembly, processing and transmission of the different types of information to users. Thus, when systems' technical resources for processing data are saturated, their software is improved, and for this

purpose the latest achievements in the field of artificial intelligence are being introduced into reconnaissance systems. Among these are, in particular, methods for processing information which, until recently, was related to human functions: data correlation, employment of deductive and inductive reasoning, making decisions by imprecise principles, recognition of complex patterns and others.

The work going on in the interests of military reconnaissance systems, has a fundamental and practical character. First, Questions of methodology for building systems are investigated and the resources developed which support creating them. The introduction of methods of artificial intelligence into reconnaissance resources and systems is second.

At the present time, creating robots and robot-like self-controlled systems for the assembly and initial sorting of reconnaissance data; describing reconnaissance by subject area and presenting it in computers; controlling and updating data bases; detecting discrepancies and deficiencies in stored information; the dialog between man and the computer in natural or near-natural language; adaptating and teaching systems for processing information based on the input information, relate to a number of tasks being solved in reconnaissance systems by artificial intelligence methods.

Various reconnaissance resources and systems are being built in Western countries' armed forces on this basis. They will provide rapid detection, analyze and decode radar signals; analyze the results of aerial photoreconnaissance; analyze post-flight air and radio electronic reconnaissance data; detect the radio frequency on which important information is being transmitted and create interference for its suppression, etc.

The greatest interest is shown in the creation of collection systems based on smart sensors and the expert-dialog systems being developed. Their details are being decided.

Smart reconnaissance sensors are special sensory transducers which collect the initial reconnaissance information. They are made in the form of receptor devices which react to changes in the characteristics of electromagnetic, acoustic, seismic and other fields or their combinations by the penetration of objects of interest into the sensor's zone of operation. The employment of sensory transducers for collecting reconnaissance information became important, thanks to their being provided with knowledge concerning the tasks being resolved and the use of artificial intelligence methods. The knowledge received by them allows purposeful collection of information. Data feeding into the sensor from exterior surroundings are processed in real time, and their contents are determined and decisions are made relative to the kind of target or the effects they will have on the sensor. Such a sensor, in principle, is a prototype of a smart robot-scout. In the foreign technical literature, automatic radars and sonars, i.e., which work without operators, and other detection installations are grouped under the heading of sensors. Robot-scouts are being set up on mobile platforms.

Usually, in the make-up of smart sensors there are data transponders, responsive to various physical fields; memory devices; analog-digital converters; microprocessors; and logic units.

According to foreign press information, at the present time, sensors are used for detecting enemy ground and underwater targets, in high-explosive devices for the borders, target signal-protection systems, for detecting low-flying aircraft and underwater targets. It is expected that smart sensors will be used in the American REMBASS surveillance system, and at a great distance behind the line of battle. The acoustic-seismic sensor contains type MAS1802 or MAS1804 microprocessors, a program for solving tasks by the rapid Fourier transform method through 64 components, a power pack (5 mW in standby and 80 mW operating condition), and a logic-decision element (dimensions 50 X 20 mm).

An important part of any smart sensor is the logic output block, which solves processing tasks by induction and deduction methods, but also makes decisions by other methods being used in artificial intelligence. Smart sensor systems are built on the basis of single sensors.

The possibility of developing single sensors and also the appearance of rotary radio communications systems allowed proceeding to the creation of group sensors known abroad as sensor networks. In them, each sensor processing part of the knowledge for solving a local task detects a discrete enemy target characteristic or parameter. Individual sensors, combined by means of a radio communications network into a single system permit the reception of a group of target parameters as a single aggregate. Thus, it is theoretically possible to receive a valid estimate of the situation even while insufficiently reliable and incomplete and sometimes even contradictory data is feeding in from individual transducers because of the simultaneous solution of tasks by a multitude of interacting sensors and processing nodes.

Sensor systems are built on two principles: hierarchial and by groups. In the hierarchial method a network includes pre-processing sensor-transducers, intermediate processing nodes, terminal processing and control nodes. As a group, all nodes can receive and process information.

Nodes coming into a group, depending on the presence in them of data can transmit control inputs to other sensor groups, while adjusting them for optimal operation. Such organizational principles of a reconnaissance system has been named a committee in the foreign literature. In both the first and the second case, networks have the possibility of self-adjusting their structures.

One of the important achievements of artificial intelligence is the creation of expert-dialog processing systems. Their essence lies in the fact that knowledge on this or that field is loaded into specially-organized computer memory. They include data and rules for using procedures for converting information by the introduction of new information related to the type previously built in. Similar information in artificial intelligence systems have been named data bases. Such an approach is a natural further development of the conception of data banks widely used in automated control systems. Data banks thus become a composite part of the data base. Highly qualified

specialists and experts load knowledge into the computer, thanks to which the possibility of processing the information is significantly expanded. As emphasized in the foreign press, the data base occupies the central place in the installation's program. The data base comprises: basic rules (expressed both as assertions and input variables and logical expressions); basic facts (current and correlated information concerning the enemy); general rules, allowing the system to control its own actions for the search and selection of information by means of special rules and facts.

Special formalized languages are used to present information in such data bases. Specialized software have been developed based on them including program systems with linguistic processors which permit a user to access the system in natural language. Additionally, there are resources which explain to the operator how and on what basis the computer solved an assigned task.

Research and development, carried on abroad, has shown that such systems must be primarily in staffs and processing centers. Thus, their introduction is mentioned in a number of technical and subjective works. Among the first is the construction of a system diagram based on a small program being developed for production and a large set of rules being developed by military specialists. Among the difficulties of the second type is the fact that it is precisely the user and not the technical system developer who inputs the initial information. Thus, the process of system argumentation must always be closely tied to the logic process of the human inputter.

Further development of collection systems and the processing of reconnaissance information, in Western specialists' opinion, must proceed to the creation of complex systems, which combine collection sensor systems with expert-dialog processing systems. In this case, each sensor, possessing part of the knowledge concerning the enemy, is regarded as a data base source. But, because it does not have available sufficient external and internal knowledge to carry out reconnaissance tasks in general, the latter must be divided into the following subtasks: break down the overall task into parts, distribute the subtasks among the appropriate solvers, execute the individual tasks, and synthesize the results. An example of such a system is the American SV/X which is a combination of sensors, which sense electromagnetic and acoustic signals, and a data base. Data processing in it is heirarchial with three levels: processing the characteristics by the sensors; processing the information about the target--the carrier of the signal source; and the processing of the information concerning the situation.

In this system, it is noted in the foreign press, a method for advancing and checking a hypothesis is used to arrive at conclusions, and decisions, being made at many levels in the course of the deductions made by the system, are presented to the operator. It is also emphasized that the output information directly in the transducer is not separated out but is a result of their interaction with the data base. The programming system is written in the INTERLISP programming language.

All that has been said is evidence of the persistent artificial intelligence research methods for the purpose of collecting and processing reconnaissance information. In Western military specialists' opinion, technical and

subjective difficulties can be overcome primarily because of the large appropriations being allocated for the development of resources for computing techniques and methods of applied mathematics and programming for military purposes from the NATO countries' budgets.

COPYRIGHT: "Zarubezhnoye voyennoye obozreniye," 1985

9355

CSO: 1801/25

FOREIGN MILITARY AFFAIRS

"ARAPAHO" SYSTEM OF FLIGHT DECKING FOR CONTAINER TRANSPORTS

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 8, Jul 85 (Signed to press 7 Aug 85) pp: 69-71

[Article by Reserve Col M. Pavlov; "The ARAPAHO System"]

[Text] While accomplishing militaristic preparations, directed against the countries of the socialist community, the military-political leadership of the USA and the other countries of the aggressive NATO bloc, consider that in the event war breaks out in the European theater, its outcome will depend to a great extent on the continuous delivery of troops, armament, rations, and various material and technical resources from the American continent, a great portion of which will be delivered by the merchant fleet. The fixed attention of the Pentagon on sea transport is demonstrated by the constant presence of operational formations in various regions of the world ocean, and also by the positioning of armed forces and bases on the territories of other states, remote from the USA.

As is reported in the Western press, ships of private steamship companies have participated in all modern military conflicts at sea, to one degree or another. It is emphasized also, that in a large armed conflict, the escort ships of the U.S. Navy and other NATO countries will not be sufficient to protect their naval lines of communication. Therefore, for more than ten years, the Navy command has shown increased interest in merchant fleet ships, as potential aircraft carriers, being utilized for ASW and air defense, for patrolling the open sea, for transporting cargo by helicopters from one ship to another, for mine-sweeping, and for amphibious assault landings.

In the U.S. Navy, the ARAPAHO project is being developed which involves accommodating aviation systems and support equipment, contained in modules, on merchant ships (primarily container ships). The latter (modules) are steel, and are the size (2.4 x 6.1 meters or 2.4 x 12.2 meters) of standard cargo containers (the weight of the latter with cargo weighs up to 37 tons), which are used for international transport. Repair workshops, administrative and living accommodations, armories, fuel, etc., can be installed in them. A helicopter (aircraft) hanger, with a light cover protecting it and sliding doors installed on rollers, can be made from the container-modules.

On the deck of modern container ships there is enough free space (no derricks, cranes, ventilation pipes, antennas) to assemble from steel trellised planking a take-off and landing strip up to 90 m long for the flights of helicopters and even vertical or horizontal take-off and landing aircraft of the HARRIER type. For the latter, it is also envisioned to install special catapults, which, judging by material of the foreign press, are comparatively light weight (around 40 tons). The entire complex, consisting of 60-70 containers having a total weight of 900 tons, can be prepared at an air base, loaded on a prime mover or railroad flatcars (30-35 pieces), delivered to port and transferred by portable cranes to the ship's deck. A 40-foot container is loaded on board the ship by a modern portable crane in 55 seconds. The containers may even be transported by C-5A GALAXY, C-141 and C-130 aircraft. As the foreign press reports, tests have shown that the entire system can be loaded in 4-5 hours by ordinary port equipment, and then assembled and made mission-ready, at sea, in 14 hours.

American military specialists consider that even with the stowage of helicopter suabunits on container ships for 48 hours, the ARAPAHO system is at present the most rapid means to deploy aviation systems on merchant ships for their employment at sea.

According to foreign press information, large contemporary containerships are suited more than any other for the ARAPAHO installation. An example is the SL-7 (displacement of 51,000 tons, speed of more than 33 knots), and the LIGHTNING (displacement about 27,000 tons, capacity 1,100 containers).

As it is noted in the foreign press, the preliminary shore trials of the ARAPAHO system were conducted in September 1982, at a special area at the U.S. Navy's aviation test center (Lakehurst, New Jersey). The SH-3H SEA KING, CH-46E SEA KNIGHT and the heavy CH-53H SEA STALLION helicopters (flight weight 13 tons) made 92 landings on a small landing platform (of which 31 were at night). After shore trials, this system was moved on tractor-trailers over two weeks (in all, 59 hauls) to Norfolk for loading aboard the containership EXPORT LEADER, having a gross capacity of 18,000 net-registered tons. It is believed that in war time, the transfer will not take more than 48 hours. The loading of the modules on the ship took 11 hours, using typical systems without special briefings of dock workers and the use of supplementary equipment.

The system included 18 modules, a filling station and a flight deck (about 1,200 (around 1,200 m²). The aviation fuel (JP-5 kerosene) was stowed in standard tanks with a capacity of up to 19,000 litres in the stern section of the ship. Two diesel generators of 250 kW each were also transported and set up in standard containers. The support sub-systems included: fire-fighting equipment, aviation combat equipment, launch assemblies, units for refueling and draining fuel, heating, ventilation, air conditioning and lighting systems. The fresh water was available in the ARAPAHO complex, and sea water for the fire-fighting system and a reserve of fresh water were drawn from the ship's system. A special group from the U.S. Navy's aviation-technical center completed assembly and check of the work of all sub-systems on the ship.

Seven U.S. Navy and Marine Corps helicopters carried out test flights from the container ship EXPORT LEADER in Chesapeake Bay. During 40 hours at sea, they completed 178 day landings and 45 night landings. Four principal types of helicopters participated in the flights: Sh-3H SEA KING, CH-46E SEA KNIGHT, SH-2E SEA SPRITE of the LAMPS MK1 system and the HH-1K IROQUOIS (for fire suppression).

During the day, the flights were conducted from two areas on a deck (each 20 x 30 meters) significantly bigger than on ships and at night, only from one, which was illuminated and equipped with facilities which alleviated the approach of helicopters from the right and left of the ship.

The primary objectives of the ARAPAHO system trials were: to determine the potential for employing contemporary flying systems in the unusual conditions of a ship; to work out the technique for assembling the modules and the transport and loading of the system aboard ship by ordinary port equipment; to check the safety of flights during the day and at night under ordinary weather conditions; to work out questions concerning communication and inter-departmental relations during the participation in the the flights by helicopters of the NATO bloc allies.

The maximum allowable rolling of the ship, the movement of the deck, the force and direction of the wind, the turbulence above the deck, etc., were checked while completing flights underway. The integrity and safety of aviation fuel storage, the reliability of the standard containers attachments, the strength of the lashings and deck guy ropes were also checked.

After sea trials, the ARAPAHO system was dismantled and taken from the ship in 8 hours.

According to the information of the foreign press, the serial production of such systems began with a cost of 13-18 million dollars each. According to military specialists' opinion, such systems can be deployed on approximately 200 container ships of the U.S.A. and other NATO countries.

For the time being, it is planned to deploy only sub-units of naval reserve helicopter squadrons on them. At the present time, the reserves have four squadrons, each with eight SH-3H SEA KING ASW helicopters. In addition, the question concerning the employment of civil aviation companies' helicopters, which may be mobilized in wartime for operations in coastal waters and also along naval lines of communication, was studied.

The U.S. Marine Corps command, as is emphasized in the Western press, is showing increased interest in the system. It is envisioned deploying it on ships participating in landing operations not be supported by carrier aviation. The U.S. Navy already has experience in deploying HARRIER aircraft and fire support helicopters on TARAWA-Class general-purpose assault ships, the CLEVELAND-Class helicopter transport-docks, and the IWO JIMA-Class assault helicopter-carriers. The number of naval infantry men on board is reduced with the increase in the number of HARRIER aircraft. Therefore, it is envisioned including merchant fleet ships, equipped with the ARAPAHO system, in the amphibious formations to reinforce assault landing aviation support.

The leadership of the navies of Great Britain, FRG, Australia, Canada, New Zealand, Chile, the Netherlands were also interested in the ARAPAHO system. It is planned to sell the ARAPAHO system complex to countries not having their own air-capable ships. American military experts consider that, with several changes, this system may be deployed on many merchant ships with an open deck (tankers and large bulk carriers). Similar measures, according to the calculation of specialists, reduce their freight-carrying capacity and tonnage to a significant degree, but, in return, considerably increase the convoy's combat capability.

According to the information of the foreign press, at present a container system, which provides air support, is being developed. It includes a flight deck with a special catapult, vertical or short take-off and landing aircraft, LAMPS MK3 system helicopters, air defense missile systems, the 20-mm VULCAN-PHALANX gun system, a system for producing passive interference, radar for the detection and identification of air targets, and other equipment. Test flights are planned for NATO countries' helicopters, such as the LYNX, ESSEX (Great Britain) and GAZELLE (France) from the deck of a container ship.

According to NATO's military leadership's opinion, equipping merchant ships with the ARAPAHO system will permit part of the escort ships to be released from their function of protection and, not having reduced the convoy's security, they can be given other, more important, missions.

COPYRIGHT: "Zarubezhnoye voyennoye obozreniye," 1985

9355

CSO: 1801/25

END